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POLLUTION OF THE INTERSTATE WATERS
OF THE OHIO RIVER AND ITS TRIBUTARIES
IN THE WHEELING, WEST VIRGINIA AREA
(OHIO-WEST VIRGINIA). PROCEEDINGS OF
CONFERENCE HELD IN WHEELING, WEST
VIRGINIA ON OCTOBER 13, 1971

Environmental Protection Agency
Washington, D. C.

13 October 1971

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C O N F E R E N C E

IN THE MATTER OF POLLUTION OF
THE INTERSTATE WATERS OF THE OHIO RIVER
AND ITS TRIBUTARIES IN THE WHEELING, WEST VIRGINIA AREA
(OHIO-WEST VIRGINIA)

held in
Wheeling, West Virginia

October 13, 1971

TRANSCRIPT OF PROCEEDINGS

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The conference in the matter of pollution of the interstate waters of the Ohio River and its tributaries in the Wheeling, West Virginia area (Ohio-West Virginia) convened at 9:50 a.m., on October 13, 1971, at the Elks Lodge, 32 Fifteenth Street, Wheeling, West Virginia.

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Opening Statement - Murray Stein

P R O C E E D I N G S

OPENING STATEMENT

BY

MR. MURRAY STEIN

MR. STEIN: The conference is open.

This conference in the matter of pollution of the interstate waters of the Ohio River and its tributaries in the Wheeling, West Virginia area, involving the States of Ohio and West Virginia, is being held under the provisions of section 10 of the Federal Water Pollution Control Act, as amended. The conference will cover all interstate pollution problems of the Ohio River and its tributaries from Toronto, Ohio to McMechen, West Virginia, covered by the map to the rear of me.

Under the provisions of the Act, the Administrator of the Environmental Protection Agency is authorized to call a conference of this type when, on the basis of reports, surveys, or studies, he has reason to believe that pollution subject to abatement under the Federal Act is occurring.

As specified in section 10 of the Act, the official State and interstate water pollution control agencies have been notified of this conference by Administrator William Ruckelshaus. These agencies are

Opening Statement - Murray Stein

the West Virginia Department of Natural Resources, the Ohio Water Pollution Control Board, and the Ohio River Valley Water Sanitation Commission.

Both the State and Federal Governments have responsibilities in dealing with water pollution control problems. The Federal Water Pollution Control Act declares that the States have primary rights and responsibilities for taking action to abate and control pollution. Consistent with this, we are charged by law to encourage the States in these activities.

At the same time, the Administrator of the Environmental Protection Agency is charged by law with specific responsibilities in the field of water pollution control in connection with pollution of interstate and navigable waters. The Federal Water Pollution Control Act provides that pollution of interstate or navigable waters which endangers the health or welfare of any persons is to be subject to abatement. This applies whether the matter causing or contributing to the pollution is discharged directly into such waters or reaches such waters after discharge into a tributary.

The purpose of this conference is to bring together the State and interstate water pollution control agencies, representatives of the U. S. Environmental

Opening Statement - Murray Stein

Protection Agency, and other interested parties to review the existing situation and the progress which has been made, to lay a basis for future action by all parties concerned, and to give the States, localities, and industries an opportunity to take any indicated remedial action under State and local law.

I think one of the phrases I just read there is often overlooked in evaluating or looking at the purpose of the conference. I think a little explanation of that may enable you to follow the proceedings possibly more closely.

We are going to review the existing situation and the progress which has been made. That is our first job. I know from working with ORSANCO and the States of West Virginia and Ohio that these States have had active programs, and we will listen and give full credit to any progress which has been made.

In addition to that, after we have done that, we will find what future action has to be taken by all parties concerned, and at the conclusion of the conference, under this procedure, we are to give the States, localities, and industry an opportunity to take any indicated remedial action under State and local law.

In other words, I believe that the purpose of the

Opening Statement - Murray Stein

conference is to have a truly cooperate State-interstate-Federal action on this situation.

I would like at this point to have the conferees introduce themselves. I wonder if we could start at the right of the table.

MR. HORTON: Robert Horton, Executive Director of the Ohio River Valley Water Sanitation Commission, known as ORSANCO.

MR. FROST: S. L. Frost, Deputy Director for Water, Ohio Department of Natural Resources.

MR. RICHARDS: I am Earl Richards, Acting Chief, Division of Engineering, Ohio Department of Health.

MR. HENRY: Ed Henry, Chief, Division of Water Resources, Department of Natural Resources in West Virginia.

MR. RILEY: William J. Riley, Acting Director, Enforcement Division, Environmental Protection Agency, Region III.

MR. FERGUSON: J. W. Ferguson, Director, Wheeling office, Environmental Protection Agency.

MR. STEIN: My name is Murray Stein. I am the Chief Enforcement Officer for Water, Environmental Protection Agency, Washington, D. C., and the representative of Administrator Ruckelshaus.

In light of what I said before, the parties to

Opening Statement - Murray Stein

this conference are the official State and interstate water pollution control agencies and the Environmental Protection Agency. Participation in this conference will be open to representatives and invitees of these agencies and such persons as inform me that they wish to make statements. However, only the representatives of the official agencies constitute the conferees.

Now a word about the procedures governing the conduct of the conference. The conferees will be called upon to make statements. The conferees, in addition, may call upon participants whom they have invited to the conference to make statements. And we will call on other interested individuals who wish to make statements.

If you have not already done so, at the first recess I would suggest that you get in touch with your State representative, either from Ohio or West Virginia, if you wish to make a statement, and they will arrange for you to make the statement, because we will call upon the States to manage their own time when the time comes for presentation.

At the conclusion of each statement, the conferees will be given an opportunity to comment or to ask questions, and I too may ask a question or so. This procedure has proven effective in the past in moving the conference along.

Opening Statement - Murray Stein

Although we cannot entertain questions or comments from the floor -- because if we afford that privilege to one we have to afford it to all -- you can be assured that everyone will be given an opportunity to be heard fully. Please save your comments and questions, and you will be given a full opportunity to make your points when your turn comes.

And don't feel necessarily if you have something to say that you struck out if you have had one turn, because if you want to add something we will schedule you to come up again. In other words, we are here to listen to all pertinent statements and hear them fully.

At the end of all the statements we will have an executive session, a discussion among the conferees, and try to arrive at a basis of agreement on the facts of the situation. Then we will read the determination of the conferees at a public session of the conference and will hopefully at that point be in a position to adjourn.

Now, again, to follow what we are doing here, we should understand what the Federal law requires to have us do at the conference. At the conclusion of the conference, the Administrator of the Environmental Protection Agency is required to prepare a summary of it which will be sent to the conferees. The summary, according to the

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law, must include the following points:

1. Occurrence of pollution of interstate waters subject to abatement under the Federal Act;
2. Adequacy of measures taken toward abatement of pollution; and
3. Nature of delays, if any, being encountered in abating the pollution.

The Administrator is also required to make recommendations for remedial action if such recommendations are indicated.

Again, I would suggest we consider these points carefully, because a good many of the reports and questions and comments being made are going to be directed to the points that I just indicated which are required by law. The conferees must come up with this kind of determination at the conclusion of the conference.

A record and verbatim transcript of the conference is being made by Mr. Joe McLaughlin. This is being made for the purpose of aiding us in preparing a summary and also for providing a complete record of what is said here.

It usually takes about 3 or 4 months for the transcript to come out in printed form. If you wish a

Opening Statement - Murray Stein

record or part of it beforehand, you can check with the reporter, who is an independent contractor, and make your own arrangements with him.

We will not print the record in color, so take this into account -- that any charts you may present will be reproduced in black and white. Try not to refer to color if you use graphic aids in your presentation, as they may be without meaning in the reading of the transcript.

We will make copies of the summary and transcript available to the official State and interstate agencies and have generally found that for the purpose of maintaining relationships within the States the people who wish summaries and transcripts should request them from the State agency rather than come directly to the Federal Government. When the conference is concluded, we would prefer people who are interested in the problem to follow their normal relationships in dealing with State agencies rather than with the Federal Government. This has worked successfully in the past, and we would be most happy to make this material available for distribution.

Due to the many entrances to this hall we have discovered that many of the people did not register. We do have a registration desk at the outside. We would appreciate it if during the lunch break you may want to

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register so your name will be available for distribution of some of these materials.

In addition to that, I understand at lunch there will be a buffet lunch available behind the partition in the back of the room, and the price of that I understand is \$3.00.

The agenda we will follow for the conference will be a presentation by the Federal Government first, then a presentation by West Virginia, then by Ohio, and then by ORSANCO. All these agencies will manage their own time and call on either Federal, State, or local participants who have indicated that they want to participate.

If there is any problem about a presentation or the agenda that cannot be resolved, please see me during one of the breaks and we will try to work this out.

I look forward to a very pleasant conference.

I would suggest that all speakers and participants, other than the conferees, who are making statements come to the lectern and identify themselves for the purposes of the record.

At this point I would like to call on Mr. William Riley for the Federal presentation.

Mr. Riley.

MR. RILEY: Thank you, Mr. Chairman. I would

Robert Cantor

like to call on Mr. Robert Cantor, Acting Chief of the Enforcement Branch of the Wheeling office, to present the Federal statement.

STATEMENT OF

ROBERT CANTOR

ACTING CHIEF, ENFORCEMENT BRANCH

WHEELING OFFICE

ENVIRONMENTAL PROTECTION AGENCY

WHEELING, WEST VIRGINIA

MR. CANTOR: Mr. Chairman, conferees, ladies and gentlemen. I am Robert Cantor, Acting Chief of the Enforcement Branch, Wheeling Office, Environmental Protection Agency, Wheeling, West Virginia.

Mr. Chairman, I would like at this time to have this report, "Interstate Pollution of the Ohio River - Wheeling, West Virginia - Steubenville, Ohio Area," and the accompanying appendix, entered into the conference record.

MR. STEIN: Without objection, this will be entered into the record as if read.

(The report and appendix referred to follow:)

A REPORT ON POLLUTION
OF THE OHIO RIVER
IN THE
MURKING, WEST VIRGINIA AREA

U. S. ENVIRONMENTAL PROTECTION AGENCY

REGION III

SEPTEMBER 1971

Interstate Pollution of Ohio River
Wheeling-Staubenville Area

Errata Sheet

- Page 7, item 1 b, delete "the concentration of settleable solids plus".
- Page 7, item 1 f, delete "Cyanide" and "Nickel" from the list of substances.
- Page 9, paragraph 2, line 8, delete "the locks and dams" and add in its place "upstream reservoirs".
- Page 17, item Total Coliform/100 ml for State of Ohio, insert "1000**".
- Page 17, item Fecal Coliform /100 ml for State of Ohio, delete "200**".
- Page 17, item Radioactivity, unit of measurement should read (pci/l).
- Page 18, Table 2 title to read "Ohio's Proposed Temperature Criteria for the Ohio River".
- Page 23, Table 3: "Belmont County S.D. #1" to read "Belmont County S.A. #1"
- Page 25, first line: "Saint George Paper Company" to read "S. George Paper Company"
- Page 39, second line from top; change to read "Company at Pollansbee and Wheeling Pittsburgh Steel at Staubenville."

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INTRODUCTION

On the basis of reports, surveys or studies, the Administrator of the U. S. Environmental Protection Agency, having reason to believe that pollution from sources in Ohio and West Virginia was endangering the health or welfare of persons in Ohio and West Virginia, called a conference of the States of Ohio and West Virginia, the Ohio River Valley Water Sanitation Commission (ORSANCO) and the U. S. Environmental Protection Agency (EPA) on the interstate pollution of the Ohio River. The conference was called in accordance with Section 10(d) of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1160).

The purpose of this report is to delineate the characteristics of this pollution of the Ohio River; the municipal and industrial sources of this pollution; the effects of this pollution upon water quality and water uses; the adequacy of present wastewater treatment facilities; and future abatement requirements.

This report on pollution of the interstate waters of the Ohio River is based upon: previous reports; data and other material obtained from ORSANCO and the U. S. Geological Survey (USGS); information furnished by other Federal, State, and local agencies and individuals; official records of the Department of the Interior; and data obtained by EPA, formerly Federal Water Quality Administration, during field studies in July and August 1970.

The U. S. Department of Justice has already filed civil injunctions against five industries within the conference area. These are the Wheeling-Pittsburgh Steel Corporation plants at Steubenville, Ohio and Follansbee, West Virginia, the Koppers Company at Follansbee, West Virginia, Valley Camp Coal Company at Triadelphia, West Virginia, and Weirton Steel Division of the National Steel Corporation at Weirton, West Virginia.

SUMMARY

The portion of the Ohio River from Toronto, Ohio to McMechen, West Virginia, is the subject of this report. The river is used commercially for transportation of goods and industrial water supply. People in the area use the river for water supplies, pleasure boating and a small amount of fishing.

The river water quality is degraded throughout the area from Toronto, Ohio, to McMechen, West Virginia. Sludge banks, oil slicks, medicinal tasting phenols and harmful substances were found polluting the river. Bacteria were found in numbers exceeding the Federally approved standards set by the States. The presence of disease-producing bacteria was also verified. Other harmful substances found in excessive concentrations in the river include cyanide and lead.

Fish population studies of this area are characterized by an abundance of predominately pollution tolerant species. Good tasting fish were brought in and placed in wire baskets at selected points in this study area. Over a three day period, they acquired various levels of off-flavors depending on the site. Fish from a site 0.6 miles downstream from the Koppers Company outfalls acquired the most extreme off-flavor found. Some of the fish at this site died from the pollution in the river. Studies of the bottom dwelling organisms, suspended algae and attached growths were made in this area by EPA biologists at the same time as the water quality studies. Samples collected downstream from several of the major

industrial complexes indicated areas of serious degradation, followed in nearly every case by zones of partial natural recovery. All samples taken, however, indicated a degraded water quality.

The quality of the effluents from industrial outfalls was found to be very poor. Pollution from the industries which were surveyed contributes to violations of Federal-State water quality requirements for the Ohio River. In addition, violations of existing Federal laws concerning discharge of oil and refuse were noted at industrial outfalls.

CONCLUSIONS

1. The Ohio River from Toronto, Ohio (river mile 60.0) to McMechen, West Virginia (river mile 96.1) is degraded by waste discharges from Ohio and West Virginia, causing interstate pollution which endangers health and welfare of persons in both States.
2. The Ohio River from Toronto, Ohio to McMechen, West Virginia often contains excessive amounts of oil, phenols, cyanide and other chemicals discharged by industries in the area. Oils and solids settle to the river bottom near the outfalls and form putrescent, objectionable sludge deposits. Phenols, cyanide and other chemicals harm or kill fish and other aquatic life and taint the flavor of fish flesh; they also are a cause of much concern to municipal water supply operators.
3. Several industries along the Ohio River from Toronto, Ohio to McMechen, West Virginia discharge wastes which cause visible pollution in the area of the outfalls.
4. The Ohio River from Toronto, Ohio to McMechen, West Virginia often contains excessive densities of bacteria including pathogenic varieties which originate from untreated or inadequately treated domestic sewage; as a result, the use of the Ohio River for any type of recreation is hazardous to human health.

5. The major sources of municipal and industrial wastes being discharged to the Ohio River from Toronto, Ohio to McMechen, West Virginia are:

Municipalities

Toronto, Ohio
Steubenville, Ohio
Mingo Junction, Ohio
Brilliant, Ohio
Tiltonsville, Ohio
Belmont County S. D. #1
Weirton, West Virginia
Wellsburg, West Virginia
Beech Bottom, West Virginia
Wheeling, West Virginia
McMechen, West Virginia

Industries

Weirton Steel - Division of National Steel Corporation
Wheeling-Pittsburgh Steel Corporation
Koppers Company

6. Many tributaries to the Ohio River from Toronto, Ohio, to McMechen, West Virginia, are polluted by mine drainage which impairs use of the streams for water supplies, water-based recreation and fish propagation, and it aesthetically damages and degrades property values.

RECOMMENDATIONS

It is recommended that:

1. All waste waters discharged to the Ohio River or its tributaries in the conference area from municipal and industrial sources, including active mining operations, meet the following criteria:
 - a. the total oil concentration shall be less than or equal to 10 mg/l and no iridescence shall be visible.
 - b. the concentration of settleable solids plus the concentration of suspended solids shall not exceed 30 mg/l.
 - c. pH shall be between six and nine standard units.
 - d. there shall be no net acidity concentration.
 - e. the total iron concentration shall be 7 mg/l or less.
 - f. the discharge shall not contain amounts of the following substances which would cause the concentration in the receiving stream to exceed the acceptable level as specified in the most recent edition of the USPHS

Drinking Water Standards:

Arsenic	Copper	Phenols
Barium	Cyanide	Selenium
Cadmium	Lead	Silver
Chromium, hexavalent	Nickel	Zinc

- g. the discharge shall not contain harmful or toxic material which kill over half the test organisms in a 96-hour bio-assay.

2. All municipal waste treatment plants in the conference area shall provide a minimum of secondary treatment and adequate disinfection of their waste effluents. Secondary treatment is defined as that which provides a minimum of 85 percent reduction of both suspended solids and oxygen demanding material as measured by the 5-day biochemical oxygen demand (BOD₅) test. Adequate disinfection is defined as that which provides an effluent which will contain a concentration not greater than 200 per 100 ml of fecal coliform organisms as a geometric average value, nor greater than 400 per 100 ml of these organisms in more than 10 percent of the samples tested.
3. All industrial waste sources are to provide, as a minimum, the equivalent of secondary treatment.
4. All municipal and industrial waste sources including active mining operations in the conference area have treatment facilities installed and operating to meet the recommended criteria by December 31, 1974, except when completion is required earlier by the Federally approved water quality standards or by court decision. Interim dates for all waste sources in the conference area be submitted to the Conference Chairman within three months.
5. All concentrations of materials be determined according to the procedures outlined in the latest edition of Standard Methods.

AREA

The Ohio River defines the boundary between West Virginia and Ohio. Figure 1 represents 36 miles of the river which are the subject of this report. Most of the towns in the study area are situated along the river as shown in Figure 1. About 165,000 people lived in all these towns in 1970, a decrease of approximately seven percent since 1960.^{1,2}

Every second of the day an average of 36,000 cubic feet of water comes down the river into the area under consideration here. A drop of water in the river may take from 10 hours to 10 days to pass through this area. The average time of travel through this area is 30 hours. Tributary streams along this reach of the river add an average of 1500 cubic feet of water per second to the river. The flow in the river at any given time is controlled by the locks and dams. Flows during this study ranged from 12,800 cfs to 53,600 cfs as calculated from data on the Pike Island Dam releases.

The Corps of Engineers maintains three locks and dams on this reach of the Ohio River providing a nine foot pool depth for year-round navigation. The Pike Island Lock and Dam (Figure 1) is the newest of the three. The Pike Island Locks provide a vertical lift of 17.8 feet while the older locks at Warwood and McMechen provide lifts of only 8.4 feet and 7.3 feet, respectively. The upper 24 miles of the river in this area are on the pool maintained by Pike Island Dam.



FIGURE 1
OHIO RIVER
Wheeling Area

In this area, the river flows in a narrow valley about 600 feet deep. Occasional islands and small flood plains exist at wide parts of the valley. At the upstream portion of the reach of the river under consideration, the valley walls contain thick clays, which are used in that area's ceramics industry. Coal and limestone appear on hilltops further downstream. These deposits are found closer down to the river as it flows south past Wheeling. The combination of limestone and coal produces highly buffered water draining from the many old surface mines in the area. The sulfate and iron from mine drainage have colored many tributary stream beds red and orange. Historically, it was the rich coal veins in this area which brought the steel industry to Weirton, Steubenville, and Wheeling. Large electric generating plants were built more recently. These electric plants use some of the worlds tallest smokestacks to carry smoke from their coal fired boilers above the hilltops and spread it over ridges and valleys. The older steel industry and the newer power generating plants both depend on the river to carry fuel for their furnaces and to supply water necessary for their operation.

WATER USES

PRESENT USES

The Ohio River from Toronto, Ohio, river mile 60.0, to McMechen, West Virginia, river mile 96.1, is used primarily for navigation and as a source for industrial water supplies. Other uses include municipal water supplies, recreation and fishing. At the present time, there are no hydro-electric power plants on the Ohio River in this area.

Municipal Water Supply

Three communities in this reach use the Ohio River as a raw source for water supply. Toronto and Steubenville, Ohio and Wheeling, West Virginia use the Ohio to supply approximately 113,900 people with 13.94 million gallons per day. All other communities along the river in this reach rely on ground water from infiltration galleries, Ramney wells, and drilled wells for raw water sources.

Fishing

Commercial fishing is non-existent on the Ohio River within this study area. However, the river is used for sport fishing although the use is limited by the type of fish population (predominately carp, gizzard shad and channel catfish) and the edibility of the fish. Fishermen are also reluctant to fish in the river because of the oil, scum, and debris that persist throughout the area.

Recreation

Boating is the main recreational use of the Ohio River in this area. The Corps of Engineers reports that the 14 marinas, ramps, or docks along the 36 miles of river between Toronto and McMechen have a mooring capacity of 488 berths. For comparison, the 40 miles of river in Pennsylvania from Pittsburgh to the Pennsylvania-West Virginia line has a mooring capacity of 185 berths at nine facilities.³

Water contact recreation, such as water skiing and swimming, is limited because of the oil and floating debris that persists in most sections of the river. More important, but not visible, is the high concentration of bacteria, including pathogenic organisms, indicating the presence of a health hazard to persons coming in contact with the water.

Industrial Water Supply

The Ohio River from Toronto, Ohio to McMechen, West Virginia, is used extensively by industries as a source of process and cooling water. Total water use is in excess of 2.8 billion gallons per day, of which approximately 90 percent is used as once-through cooling water for thermal electric power generation. Two major steel producers account for the majority of the remaining ten percent, the bulk of which is used for cooling purposes.

Navigation

Navigation is an integral part of the economic growth of

this area. Commercial barges carry an ever increasing quantity of material over this reach as shown in the table below:

<u>Year</u>	<u>Millions of Tons through Pike Island Locks</u>	
	<u>Upstream</u>	<u>Downstream</u>
1965	12.0	4.5
1967	14.1	4.3
1968	15.2	4.6

The U. S. Army Corps of Engineers indicate that the following tonnages of materials passed through the Pike Island Lock in 1968:

<u>Material</u>	<u>Total Tonnage in Millions of Tons</u>	
	<u>Upstream</u>	<u>Downstream</u>
Coal & Coke	8.1	1.1
Oil & Gasoline	3.6	0.4
Iron & Steel	0.7	1.8
Stone, Sand & Gravel	0.2	0.2
All Others	2.6	1.1

The predominance of transportation of fuels is also reflected in the types of terminal facilities in this area. The following table lists the number of terminals capable of handling the specific material:

<u>Material</u>	<u>Number of Terminals</u>
Coal & Coke	16
Oil & Gasoline	10
Iron & Steel	6
Sand & Gravel	6

Some facilities can handle more than one type of material making the above list non-additive. A total of 37 separate terminals exist, but the above list does not include all the types of terminals in the area. Other terminals handle miscellaneous materials or provide mooring services.⁴

WATER USES AS DEFINED BY WATER QUALITY STANDARDS

In the establishment of Water Quality Standards, the States listed the uses for each interstate stream in order to determine the applicable water quality criteria. The following delineates the uses of the Ohio River as given by West Virginia and Ohio in their respective Water Quality Standards, as approved by the Federal Government:

West Virginia

1. Water Contact Recreation
2. Water Supply, Public
3. Water Supply, Industrial
4. Water Supply, Agricultural
5. Propagation of Fish and Other Aquatic Life
6. Water Transport, Cooling and Power
7. Treated Wastes Transport and Assimilation

Ohio

1. Public Water Supply
2. Industrial Water Supply
3. Aquatic Life - Warm Water Fish
4. Recreation
5. Agricultural Use and Stock Watering

GENERAL WATER QUALITY CRITERIA

Each State's Water Quality Standards included criteria designed to protect the water uses of the stream. Specific approved criteria by States are listed in Table 1. The following is the

TABLE 1

Current Approved Specific Criteria-Ohio River

<u>Ranges</u>	<u>West Virginia</u>	<u>Ohio</u>
pH (Standard Units)	6.0-8.5	6.0-8.5
<u>Maximums</u>		
Temperature (°F)		
(May-November)	87°	1/
(December-April)	73°	1/
Temperature change (over natural)	5°	5°
Threshold Odor No. @ 60°C	8*	24*
Total Coliforms /100 ml	1000**	-
Fecal Coliform /100 ml	-	200**
Radioactivity (ci/l)		
Gross Beta	1000	1000
Dissolved Strontium-90	10	10
Dissolved Alpha	3	3
<u>Maximum Concentrations (mg/l)</u>		
Toxic Substances	1/10 TL _{m96}	1/10 TL _{m48}
Arsenic	0.01	0.05
Barium	0.50	1.0
Cadmium	0.01	0.01
Chromium (hexavalent)	0.05	0.05
Lead	0.05	0.05
Silver	0.05	0.05
Nitrates	45.0	-
Phenol	0.001	-
Cyanide	0.025	0.025
Fluoride	1.0	1.0
Selenium	0.01	0.01
Iron (Total)	-	-
Manganese (Total)	-	-
Dissolved Solids	-	750.0
Dissolved Solids	-	500.0**
<u>Minimum Concentrations (mg/l)</u>		
Dissolved Oxygen	5.0	4.0
For 16 of any 24 hours	-	-
Daily Average	-	5.0

* - Daily average.

** - Monthly average.

1/ See TABLE 2.

TABLE 2

Ohio's Temperature Criteria for the Ohio River

Maximum Temperature (°F) During Month

January	50	July	89
February	50	August	89
March	60	September	87
April	70	October	78
May	80	November	70
June	87	December	57

general criteria adopted by the respective States and approved by the Federal Government:

West Virginia

"Certain characteristics of sewage, industrial wastes or other wastes or factors which render waters directly or indirectly detrimental to the public health or unreasonably and adversely affect such waters for present or future reasonable uses, are objectionable in all the waters of the State. Therefore, the State Water Resources Board does hereby proclaim that the following general conditions are not allowed in any of the waters of the State."

"No sewage, industrial wastes or other wastes entering any of the waters of the State shall cause therein or materially contribute to any of the following conditions thereof, which shall be the minimum conditions allowable:

1. Distinctly visible floating or settleable solids, suspended solids, scum, foam or oily slicks of unreasonable kind or quality;
2. Objectionable bottom deposits or sludge banks;
3. Objectionable odors in the vicinity of the waters;
4. Objectionable taste and/or odor in municipal water supplies;
5. Concentration of materials poisonous to man, animal or fish life;
6. Dissolved oxygen concentration to be less than 3.0 milligrams per liter at the point of maximum oxygen depletion;

7. Objectionable color;
8. Objectionable bacterial concentrations;
9. Requiring an unreasonable degree of treatment for the production of potable water by modern water treatment processes as commonly employed."

Ohio

"Minimum conditions applicable to all waters at all places at all times:

1. Free from substances attributable to municipal, industrial or other discharges that will settle to form putrescent or otherwise objectionable sludge deposits;
2. Free from floating debris, oil, scum, and other floating materials attributable to municipal, industrial or other discharges in amounts sufficient to be unsightly or deleterious;
3. Free from materials attributable to municipal, industrial, or other discharges producing color, odor or other conditions in such degree as to create a nuisance;
4. Free from substances attributable to municipal, industrial or other discharges in concentrations or combinations which are toxic or harmful to human, animal or aquatic life."

SOURCES OF WASTES

The conference area contains numerous sources of untreated or inadequately treated wastes which are harmful and hazardous. These sources are given here in their order of significance as they affect water uses.

The most important source of wastewater in the area causing pollution is the steel industry and its related industries. Iron and steel are produced at Steubenville and Mingo Junction, Ohio by the Wheeling-Pittsburgh Steel Corporation, and at Weirton, West Virginia by the Weirton Steel Division of the National Steel Corporation. The flue gas wash water from these blast furnaces at these plants passes through clarifiers to remove solids. These clarifiers are frequently overloaded, however, and solids are discharged to the river where they form deposits on the stream bottom.

The steel is shaped and sometimes coated at other steel plants in the area. Weirton Steel Division of National Steel has shaping and coating operations at Weirton, West Virginia and Steubenville, Ohio. Wheeling-Pittsburgh Steel Corporation has shaping and coating plants at Steubenville, Mingo Junction, Yorkville and Martins Ferry, Ohio; and at Pollansbee, Beech Bottom, and Berwood, West Virginia. Most of these steel plants have at least some elementary form of wastewater treatment. Oil is another significant waste found in steel mill discharges, especially from the shaping and coating plants. Rolling mills use lubricating oils in the large

machinery as well as coating oils on the steels being formed. A portion of these oils find their way into the river. Other wastes from steel mills are: acid and alkaline materials from rinses, hexavalent chromium, cyanide and iron.

The steel companies also produce coke for their furnaces. Coke is made by heating coal in the absence of air. The wastewaters from coke plants contain phenols, cyanides, ammonia and organic chemicals. The coke plants at Weirton and Follansbee, West Virginia, owned by Weirton and Wheeling-Pittsburgh Steel, treat their effluents to remove much of the pollutants.

The Koppers Company operates a coal tar plant at Follansbee, West Virginia. Coal tar is supplied from the nearby coke plants. Various solvents, tars, and chemicals are produced. Wastewaters from the plant contain phenols, oils, solids, and alkaline materials.

Raw and inadequately treated sewage discharged to the river and streams is also a major pollution problem in this reach of the Ohio. These wastes carry great numbers of intestinal bacteria from human excretions, and pathogenic organisms are present. The municipal waste sources discharging to the Ohio River in the conference area are listed in Table 3. Several municipalities do not provide complete sewage collection systems for all the homes in their area. Harmon Creek, at Weirton, West Virginia, for example, reflects the lack of a complete collection system in that area. The high bacteria concentrations found in Harmon Creek are an indication that

TABLE 3

Sources of Municipal Wastes
Ohio River - Wheeling Area

<u>River Mile</u>	<u>Name</u>	<u>Population Served</u>	<u>Type of Treatment</u>
59.0	Toronto, Ohio	8,000	Primary + Chlorination
68.0	Steubenville, Ohio	34,700	Primary + Chlorination
71.0	Mingo Junction, Ohio	5,300	Primary + Chlorination
74.5	Brilliant, Ohio	2,400	Primary + Chlorination
82.0	Rayland, Ohio	600	Primary + Chlorination
83.0	Tiltonsville, Ohio	2,570	Primary + Chlorination
84.0	Yorkville, Ohio	1,800	Primary + Chlorination
92.0	Belmont County S. D. #1		Primary + Chlorination
	(Martins Ferry, Ohio)	11,600	
	(Bridgeport, Ohio)	3,700	
	(Brookside, Ohio)	800	
	(Bellaire, Ohio)	10,900	
61.8	Weirton, West Virginia	30,000	Primary + Chlorination
70.5	Follansbee, West Virginia	5,000	Secondary + Chlorination
74.2	Wellsburg, West Virginia	5,500	None
78.0	Beech Bottom, West Virginia	500	None
91.0	Wheeling, West Virginia	70,000	Primary + Chlorination
94.2	Benwood, West Virginia	3,500	Secondary + Chlorination
96.0	McMechan, West Virginia	3,000	Primary + Chlorination

many homes discharge raw sewage directly into the creek.

Coal mining activities are the third most important source of waste. Coal mining and related activities are carried out on tributaries to the Ohio River. Acid water drains from old, inactive mines carrying high concentrations of iron and sulfate. Active mines also discharge similarly polluted water. Frequently, water from the coal preparation plants pollute the receiving streams with black coal dust. Mine refuse piles are also a known source of highly polluted water. The water pollution from coal mining activity is a unique source of industrial waste in that it continues long after the mining has ceased. Acid waters carrying iron, sulfates and other dissolved materials comes from many sites of mining activity; the receiving streams become red and yellow, and the stream beds are caked with "yellowboy," a yellow precipitate of iron hydroxide usually containing calcium sulfate and aluminum hydroxide. Mine refuse is washed to the streams where it accumulates in stream beds. Many of the tributaries to the Ohio River in this area are grossly polluted by waste from coal mining activities.

Other industries discharge polluted waters. Thermal electric generating plants discharge large volumes of heated water. American Electric Power operates the Cardinal Plant and the Tidd Plant at Brilliant, Ohio and the Beech Bottom Plant at Power, West Virginia. The Cardinal and Tidd Plants, in combination, are a significant source of heated water. The Federal Paper Company

at Steubenville, Ohio and the Saint George Paper Company at Wellsburg, West Virginia are among the paper processing plants known to discharge high amounts of solids. The river below these plants has been visibly discolored by these discharges. Sand and gravel companies frequently discharge excess concrete to the banks of the river. Large fan-like deposits of concrete extend into the river at these locations. Oil terminals along the river have had few incidents of oil spills, but oil slicks have been observed in the area. Other industries in the area have discharges which have not been investigated.

Table 4 is a listing of industrial dischargers to the Ohio River in the Wheeling area. Effluents from some of these industries were sampled during the field survey for this report. Coal mining operations are not included in the table. Only coal loading facilities are listed.

TABLE 4
Industrial Sources of Waste
to the Ohio River

<u>Location Point</u>	<u>Industry</u>	<u>Comment</u>
59.3R	Toronto Paperboard Company	
60.5R	Titanium Metals Corporation of America	
61.8L	Standard Slag Company	Solids
62.0L	Weirton Steel-Division of National Steel Corporation	Oil, Solids Metallic Iron, Phenols, Cyanide Hexavalent Chromium, Lead, Acidic Material
64.6R	Sinclair Oil Company	Tank farm
65.7L	Advance Metal Lithographing, Inc. Signode Corporation	Solids
66.3L	Starvaggi Industries, Inc.	Solids
67.8R	Eastern Ohio River Sand and Gravel Co.	Solids
67.3R	Federal Paperboard Company, Inc.	Solids, Heat
67.4R	Hartje Brothers	No outfall visible
68.3R	Weirton Steel-Division of National Steel Corporation	Oil, Acidic Materials
68.6L	Allied Oil Company	Tank farm
68.7R	Wheeling-Pittsburgh Steel Corporation North Steubenville Plant Steubenville, Ohio	Oil, Iron, Lead Cyanide, Solids Manganese, Acidic Materials, Heat
68.8L	Wheeling-Pittsburgh Steel Corporation East Steubenville Plant Follansbee, West Virginia	Phenols, Heat Cyanide
69.1L	Allied Oil Company	Terminal

TABLE 4 (Continued)

<u>Mile Point</u>	<u>Industry</u>	<u>Comment</u>
69.2L	Koppers Company, Incorporated Follansbee, West Virginia	Phenols, Oil Solids, Heat Cyanide
70.3L	Wheeling-Pittsburgh Steel Corporation Follansbee Plant Follansbee, West Virginia	
70.6L	Follansbee Steel Company Follansbee, West Virginia	
70.8R	Wheeling-Pittsburgh Steel Corporation South Steubenville Plant Mingo Junction, Ohio	Oil, Iron, Solids, Lead, Hexavalent Chromium, Heat Alkaline Materials
71.1R	Penn Central Railroad	
71.8R	Nickle Plate Railroad	
73.3L to 73.7L	Banner Fibreboard Company West Virginia Pulp and Paper Company Pillsbury Company Mammoth Plastics, Incorporated	
74.1L	S. George Company	Solids
76.1R	Ohio Ferro Alloys Corporation	
76.5R	Ohio Power Company Cardinal and Tidd Plants	Heat
79.2L	Wheeling-Pittsburgh Steel Corporation Beech Bottom Plant Beech Bottom, West Virginia	Oil
79.8L	Ohio Power Company Beech Bottom Plant	Heat
81.1R	Tri-State Asphalt Corporation	
81.1R	Ohio Coal and Construction Company	
82.2L	Valley Camp Coal Company, No. 1-Short Creek	
82.6R	Standard Oil	

TABLE 4 (Continued)

<u>Mile Point</u>	<u>Industry</u>	<u>Comment</u>
83.5R	Wheeling-Pittsburgh Steel Corporation Yorkville Plant, Yorkville, Ohio	Oil, Solids, Iron Heat, Phenols Acidic Materials
85.5L	Esso Standard Oil Company	Terminal
85.6L	Sun Oil Company	Terminal
85.8L	American Oil Company	Terminal
86.6L	Warwood Tool Company	
86.7L	Wheeling Stamping Company	
87.9R	Wheeling-Pittsburgh Steel Corporation Martins Ferry Plant Martins Ferry, Ohio	
88.0L	Centre Foundry and Machine Company	
88.2L	Pure Oil Company	Terminal
88.9R	Quaker State Oil Company	Terminal
91.1L	Contractors Supply Corporation of West Virginia	
91.8L	Standard Sand and Gravel Company	
91.9L	Delta Concrete Company	
93.6L	Hanna Coal Company - Division of Consolidation Coal Company Shoemaker Mine	
93.8R	Delta Concrete Company	
94.4L	Wheeling-Pittsburgh Steel Corporation Benwood Plant Benwood, West Virginia	

EFFECTS OF POLLUTION ON WATER QUALITY AND USES

Various studies have been made in the study area to define the effects of pollution on water quality and water uses. In addition, the U. S. Environmental Protection Agency maintains one sampling station in the area as part of its Pollution Surveillance Program.

Figure 2 and Table 5 are descriptions of the 13 stations that were sampled by the EPA during a special study conducted from July 27 through August 7, 1970. These data illustrate the condition of the river during warm summer months. The EPA study shows that the river is in a degraded condition throughout the area. The pollution from the Weirton-Steubenville area degrades the river water quality in that area. Water quality improves downstream to a maximum just above the Pike Island Lock and Dam. At that point, the river water quality is at its best in this reach of the river. Industrial and municipal wastes cause degradation of the river from that point to the downstream end of the study area.

Both Ohio and West Virginia have agreed on the desirability of the "four freedoms" of water quality. These freedoms outline the rights to clean water which every citizen has. Each of the "four freedoms" listed below was violated during the study period.

- "1. Free from substances attributable to municipal, industrial or other discharges that will settle to form putrescent or otherwise objectionable sludge deposits;"

Figure 2
Sample Locations

Legend

- ▲ Stream Sample Locations
 ▨ Industry Outfall Sample Locations



FIGURE 2
Sample Locations

TABLE 5

Sampling Stations
Special Study-EPA-Ohio River
July-August, 1970

<u>Description</u>	<u>Mile Point</u>
Ohio River downstream of Toronto, Ohio	60.8
Ohio River opposite Steubenville, Ohio, water intake	65.3
Harmon Creek at W. Va. Route 2 bridge	-
Ohio River upstream of Steubenville, Ohio, sewage treatment plant	67.1
Ohio River downstream of Steubenville, Ohio, sewage treatment plant	67.9
Ohio River downstream of Wheeling-Pittsburgh Steel and Koppers Company	70.0
Ohio River downstream of Follansbee, West Virginia	72.0
Ohio River downstream of Wellsburg, West Virginia	75.0
Ohio River downstream of Brilliant, Ohio, sewage treatment plant	75.6
Ohio River upstream of Wheeling-Pittsburgh Steel, Yorkville, Ohio	82.7
Ohio River at Wheeling, West Virginia, raw water intake ^{1/}	86.7
Ohio River opposite Bellaire, Ohio, water intake	94.0
Ohio River upstream of Lock and Dam No. 13	95.5

^{1/} EPA Pollution Surveillance Station.

Oils and solids from industries form sludge banks in the Ohio River and its tributaries.

- "2. Free from floating debris, oil, scum, and other floating materials attributable to municipal, industrial or other discharges in amounts sufficient to be unsightly or deleterious;"

Oils from industries form slicks and scum on the Ohio River.

- "3. Free from materials attributable to municipal, industrial or other discharges producing color, odor, or other conditions in such degree as to create a nuisance;"

Phenols, mine drainage and sewage from industries and municipalities create nuisances in the Ohio River and its tributaries.

- "4. Free from substances attributable to municipal, industrial or other discharges in concentrations or combinations which are toxic or harmful to human, animal or aquatic life."

Pathogenic bacteria, chemicals and heavy metals from industries and municipalities are toxic and harmful to human, animal and aquatic life.

Much of the pollution along the river has interstate effects between Ohio and West Virginia.

BACTERIAL POLLUTION

Municipal sewage contains high numbers of bacteria, frequently including pathogenic bacteria, derived from human excreta. These

pathogenic bacteria can cause gastro-intestinal diseases such as typhoid fever, dysentery and diarrhea. Infectious hepatitis, a virus disease, can also be caused by ingesting sewage-polluted water. Eye, ear, nose, throat or skin infections may result from bodily contact with such water. As the densities of pathogenic bacteria are reduced by sewage treatment or forces of natural purification, the hazards of contacting disease are proportionately reduced.

Sewage also contains readily detectable coliform bacteria which typically occur in excreta or feces and are always present in sewage-polluted water. Though generally harmless in themselves, coliform bacteria have been considered indicators of the presence of pathogenic bacteria. The coliform group includes several types of bacteria which may come from sources other than excreta.

Testing for fecal coliform bacteria is becoming more popular as an indicator of bacterial pollution because fecal coliform bacteria specifically inhabit the intestinal tract of man and warm-blooded animals. The presence of these organisms in water is positive proof of fecal contamination which may contain associated, disease producing organisms.

Coliform Bacteria

Presently, the States of Ohio and West Virginia use the total coliform group as an indicator of bacterial pollution. The State of Ohio is in the process of changing its recreational criterion

for bacteria to the fecal coliform group. Specific bacterial criteria by State are listed in Table 1, on page 17.

Pollution surveillance by the U. S. Environmental Protection Agency includes samples at one station in the area sampled twice a month since January 1967. Through October 1970, the Ohio River at the Wheeling, West Virginia, water treatment plant intake has exceeded West Virginia's water quality standard of 1,000 total coliforms per 100 ml in 32 of the 33 months.

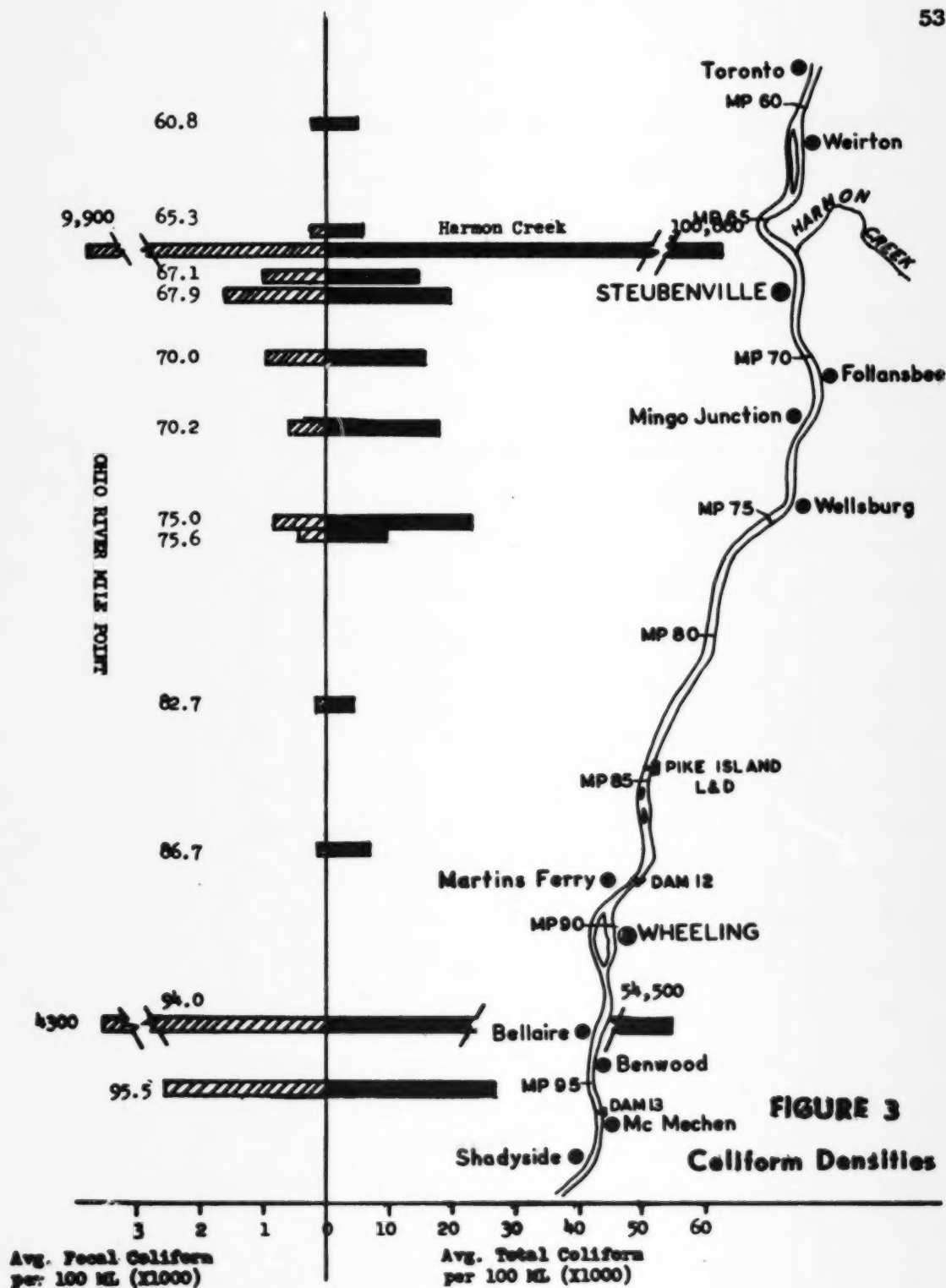
In the study of the Ohio River in July and August 1970, total coliform densities in this conference area exceeded West Virginia's standard of 1,000 per 100 ml 100 percent of the time (120 samples). Total coliform densities exceeded 5,000 per 100 ml 77.5 percent of the time and exceeded 10,000 per 100 ml 46.7 percent of the time. Figure 3 shows the average total and fecal coliform densities as plotted against Ohio River mile points.

Salmonella Bacteria

In addition, a pathogen study was made at two sampling points during this study. While coliform densities indicate the magnitude of fecal pollution which may contain disease-producing organisms, detection of pathogenic Salmonella bacteria in water is positive proof that these disease-producing bacteria are actually present.

Modified Moore swab samples were taken at the following locations:

<u>Description</u>	<u>River Mile</u>
Ohio River below Steubenville, Ohio sewage treatment plant	67.9
Ohio River at Bellaire, Ohio	94.0



Salmonella, an enteric pathogen, was isolated at both stations, showing the existence of a health hazard in the river water.

Sewage treatment plants can drastically reduce the amount of bacteria in sewage depending upon the capacity and type of plant disinfection practices and the skill of the plant operators.

PHENOLS

Phenolic materials have plagued municipal water users of the Ohio River for years. Chlorination of finished water containing excessive phenols gives a medicinal taste and odor to the water. Experience has shown that phenolic concentrations in the Ohio River are at a maximum in the winter months when the biological degradation of the phenols is retarded by cold water temperatures. For example, EPA pollution surveillance data obtained during the period 1966-1970 from the Ohio River at Wheeling had an average phenolic concentration of 0.002 mg/l for the period May through November and increased to 0.024 mg/l for the period December through April. Maximum concentration recorded during this period was 0.078 mg/l, which occurred in January, 1970.

ORSANCO records of the Wheeling water treatment plant intake for the year 1969 show an average phenolic concentration of 0.005 mg/l for the period May through November and an increase to 0.011 mg/l for the period December through April.

West Virginia's criteria for phenols in the Ohio River is 0.001 mg/l. The State of Ohio has not set a phenolic standard for the Ohio River. The special study in the warm months of July and August, 1970, showed the average phenolic concentration at the Wheeling station to be 0.002 mg/l, however, a high of 0.053 mg/l was detected at the stream station located 16.7 miles upstream of Wheeling, West Virginia.

OIL POLLUTION

Oil pollution is one of the most visible forms of pollution in the Ohio River in this area. Surface oil destroys the aesthetic value of the river and restricts its use for recreation. A large number of complaints lodged by citizens in this area to the U. S. Environmental Protection Agency concern floating surface oils. Oils also coalesce with natural sediment and other suspended material to form bottom deposits that are toxic to bottom animals, thus restricting the use of the river for aquatic life.

Oil samples were not collected as part of the special two week stream study conducted in this area. However, floating surface oils were observed on numerous occasions by the field crews. Oil analyses were part of the special 3-day industrial outfall sampling program which followed the stream sampling program. Oil concentrations in excess of 1,000 mg/l were recorded at outfalls of the Wheeling-Pittsburgh Steel Corporation's North Steubenville and Yorkville, Ohio plants. Oil concentrations exceeded 20 mg/l in

34 of 57 outfall samples taken during the 3-day period.

SLUDGE DEPOSITS

Sludges or settleable solids are a highly objectionable form of pollution since they are so readily controlled. During the EPA field survey, sludge banks were found in the river below industrial outfalls despite the churning of the powerful tow boats on the river. Notable sludge banks are found at Weirton Steel outfalls near Browns Island and at the mouth of Harmon Creek. Wheeling-Pittsburgh Steel outfalls at Yorkville have sludge banks along the shore near the outfalls. These sludges vary in consistency, but all inhibit aquatic life, hinder navigation, and cause nuisance conditions.

CYANIDES

The discharge of cyanide to water bodies is critical to the aquatic environment because of the toxic nature of the material. The States of Ohio and West Virginia have established a maximum limit of 0.025 mg/l of cyanide for the Ohio River. During the two week study in this area, this value was exceeded in nine of 86 samples (10.5 percent). The maximum concentration found was 0.040 mg/l. EPA's pollution surveillance data at the Wheeling water intake during the period 1968-1970 shows an average of 0.02 mg/l with a maximum of 0.08 mg/l

During the 3-day industrial outfall sampling program, ORSANCO's effluent standard of 0.2 mg/l for cyanide was exceeded

at three outfalls, that is, Weirton Steel at Weirton, and Koppers Company and Wheeling-Pittsburgh Steel at Steubenville.⁵

COAL MINE DRAINAGE

Many of the tributary streams to the Ohio River are intensely polluted by coal mine drainage.

Stream pollution problems within these tributary areas attributable to mine drainage are: high concentrations of acidity, iron, manganese, sulfate, and hardness; low pH, and turbidity and bottom deposits from chemical precipitates. Siltation caused by runoff from mining activities often causes severe local stream pollution problems.

The pollutants from mine drainage impair the principal water uses for municipal, industrial and agricultural water supplies; certain water-based recreation; and support and propagation of fish and other aquatic life. In addition, these pollutants cause corrosion of instream facilities and aesthetically damage and degrade the waterfront property values.

EFFECTS OF POLLUTION ON AQUATIC LIFE

In conjunction with the physical, chemical and bacteriological studies conducted during July and August 1970, certain biological studies were carried out to determine the extent of the effects of pollutants on the aquatic life of the Ohio River from Stratton, Ohio (M.P. 54.4) to New Martinsville, West Virginia (M.P. 129.1). These studies, which included fish flavor evaluations and sampling for bottom organisms, suspended algae and attached growths, were conducted at 15 stations throughout the study area (see Table 6). The fish population data was taken from previous studies.

FISH POPULATIONS

Fish population studies of the upper Ohio River were conducted during the period 1957-1959 by the ORSANCO-University of Louisville aquatic life study.⁶ The analyses of the data collected during that study consisted of dividing the Ohio River into 100 mile sections for comparative purposes. The sections 0-100 miles and 100-200 miles downstream from Pittsburgh, Pennsylvania, cover the stretch of the river under consideration in this report. A total of 20 samples were collected from 14 different lock chambers in the first 200 miles of the Ohio River.

In general, the fish population of the upper Ohio River during the 1957-1959 period consisted primarily of bullhead, carp, and shiners. The standing crop for section 0-100 miles was 38 pounds per surface acre and for section 100-200 miles was 124 pounds per acre.

TABLE 6

List of Biological Sampling Stations*

Mile Point	Description
54.4	New Cumberland Locks and Dam
56.0	Below New Cumberland Locks and Dam
62.0	In the back-channel of the Ohio River around Brown Island
63.0	In the main channel around Brown Island, approximately 0.7 miles below National Steel
66.2	Old Lock and Dam #10, above Steubenville, Ohio
68.0	Left - 1.3 miles below Harmon Creek Right - 0.1 miles below Steubenville Sewage Treatment Plant
69.9	Left - 0.6 miles below Koppers Company Right - 1 mile below Wheeling-Pittsburgh Steel
71.9	Right - 0.4 miles below Wheeling-Pittsburgh Steel, Mingo Junction
78.0	Right - 1 mile below Ohio Power Company
83.0	0.2 miles above Wheeling-Pittsburgh Steel, Yorkville, Ohio
84.0	Right - 0.6 miles below Wheeling-Pittsburgh Steel, Yorkville, Ohio
87.4	Lock and Dam #12
93.4	Left - 2 miles below Wheeling Sewage Treatment Plant
96.1	Lock and Dam #13, 1.4 miles below Wheeling-Pittsburgh Steel, Benwood, W.Va.
129.1	Lock and Dam #15

*Phytoplankton samples were collected at the chemical sampling stations and are listed in this section by station number and mile point.

A 1967-1969 study was conducted by the Federal Water Quality Administration similar to the 1957-1959 study. However, most of the lock chambers used during the earlier study have been replaced by newer and larger structures. A total of seven samples were collected within the section of the Ohio River under study in this report. The following table summarizes the composition of the fish population sampled during this study:

Range of Percentage (by weight) Composition
of Fish Population 1967-69

Species	M.P. 54.4	M.P. 84.2	M.P. 129.1
Carp	73.7 - 78.4	43.2 - 69.2	4.6 - 9.6
Bullheads	8.0 - 14.7	8.6 - 14.7	1.4 - 1.9
Gizzard Shad	2.4 - 2.6	5.0 - 32.1	1.6 - 7.8
Channel Cat- fish	2.4 - 5.6	4.5 - 4.7	45.9 -47.7
Sunfishes	1.5 - 4.4	2.1 - 3.3	10.5 -20.9
Minnows	1 - 2.2	3.9 - 8.6	17.6 -19.6
No. of species	20 - 26	18 - 26	20 - 25
Pounds/acre	180 - 238	153 - 263	78 -108

The data obtained for the 1957-59 study for individual sampling locations is not available. The only comparison that can be made must be based on the accumulated data for a 100 mile section of the river. The section of the river under study here overlaps these 100 mile sections as presented in the publication reporting on the 1957-59 study.⁶

There are, however, some observations that can be drawn from the comparative data presented in this report. The 1967-69 study indicates little change in composition from the 1957-59 study in the first 100 miles of the Ohio River downstream of Pittsburgh. The 1967-69 data shows a predominance of carp, bullhead and gizzard shad. The primary difference between the two studies in this section (0-100 miles) appears to be (1) fewer minnows (2) more gizzard shad and (3) increase in the standing crop of fishes.

The fish composition observed at mile point 129.1 indicates improvement of water quality downstream of the first 100 miles of the Ohio River. The predominance of channel catfish and sunfishes (including the basses), along with a decrease in the carp and bullheads is indicative of more favorable conditions for pollution sensitive fishes.

In summary, fish population of the section of the Ohio River from New Cumberland, West Virginia to New Martinsville, West Virginia (74.7 miles) is characterized by an abundance of fish, predominately pollution tolerant species in the upper part of this section, and some increase in pollution sensitive fishes in the lower part of this section of the river.

FISH TAINTING

Several studies have been made in the past three years concerning the palatability of fish caught in the Ohio River. Results of these studies have shown that fish taken from nearly

all points in the Ohio River have an unacceptable flavor and are generally considered undesirable for eating. Certain locations produce off-flavors in fish flesh which are characterized as being "very extreme" while others are nearly acceptable.

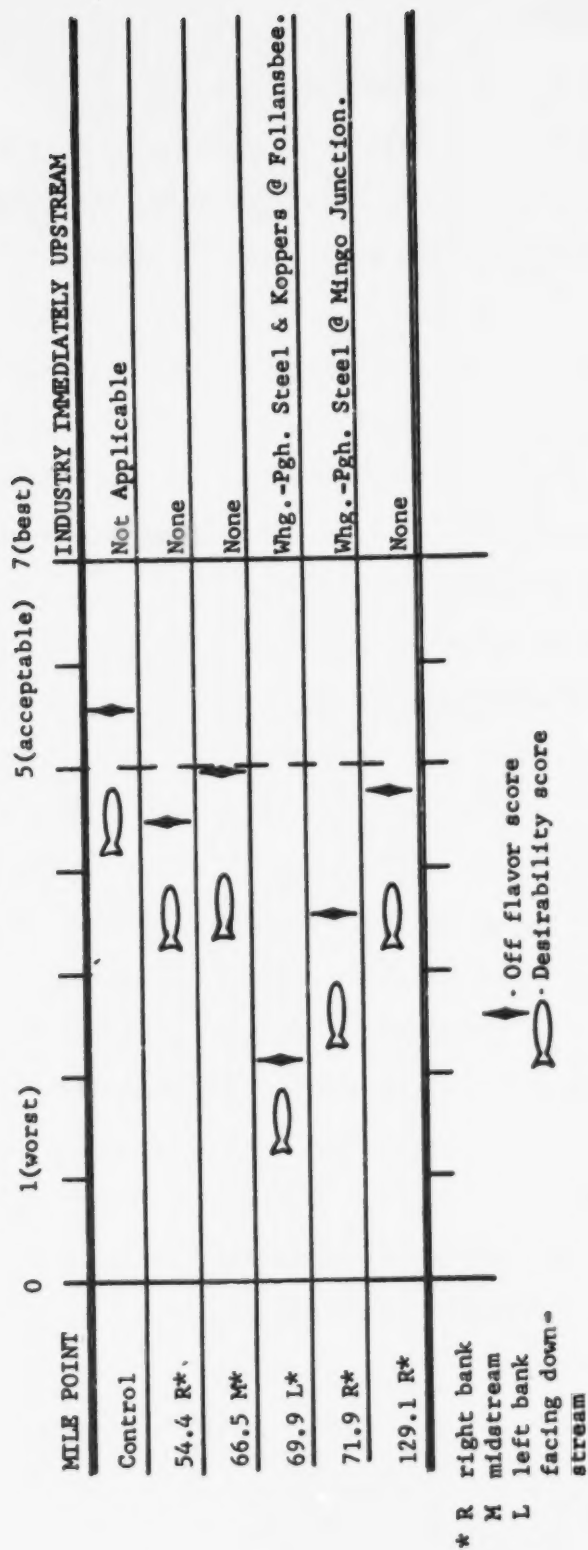
To identify sources of wastes producing off-flavors, channel catfish known to have an acceptable flavor were placed in wire baskets downstream from industrial outfalls. After an exposure period of 72 hours, the surviving fish were retrieved and subjected to a panel test. The judges scored on seven point scales the degree of off-flavor and of over-all desirability. The results of the evaluation are shown in Table 7. Fish flesh having scores from five to seven are considered to be acceptable. Using this criterion, only the control fish would be considered acceptable. The river water at all locations tested gave an undesirable flavor to the good fish placed there in this study.

Two of the catfish held at M.P. 54.4 did not survive the exposure period. The remaining four acquired a moderate off-flavor. During the four previous studies of this nature, no sample from the Ohio River ever acquired such an extreme off-flavor as was found at M.P. 69.9. This station was located 0.6 miles downstream from the Koppers Company outfalls at Follansbee, West Virginia. Of the six fish held at this location, only two survived the three day exposure period, indicating a presence of toxic substances in the water.

TABLE 7

FISH FLAVOR EVALUATION, OHIO RIVER, AUGUST 1970

DESIRABILITY & OFF-FLAVOR SCORES



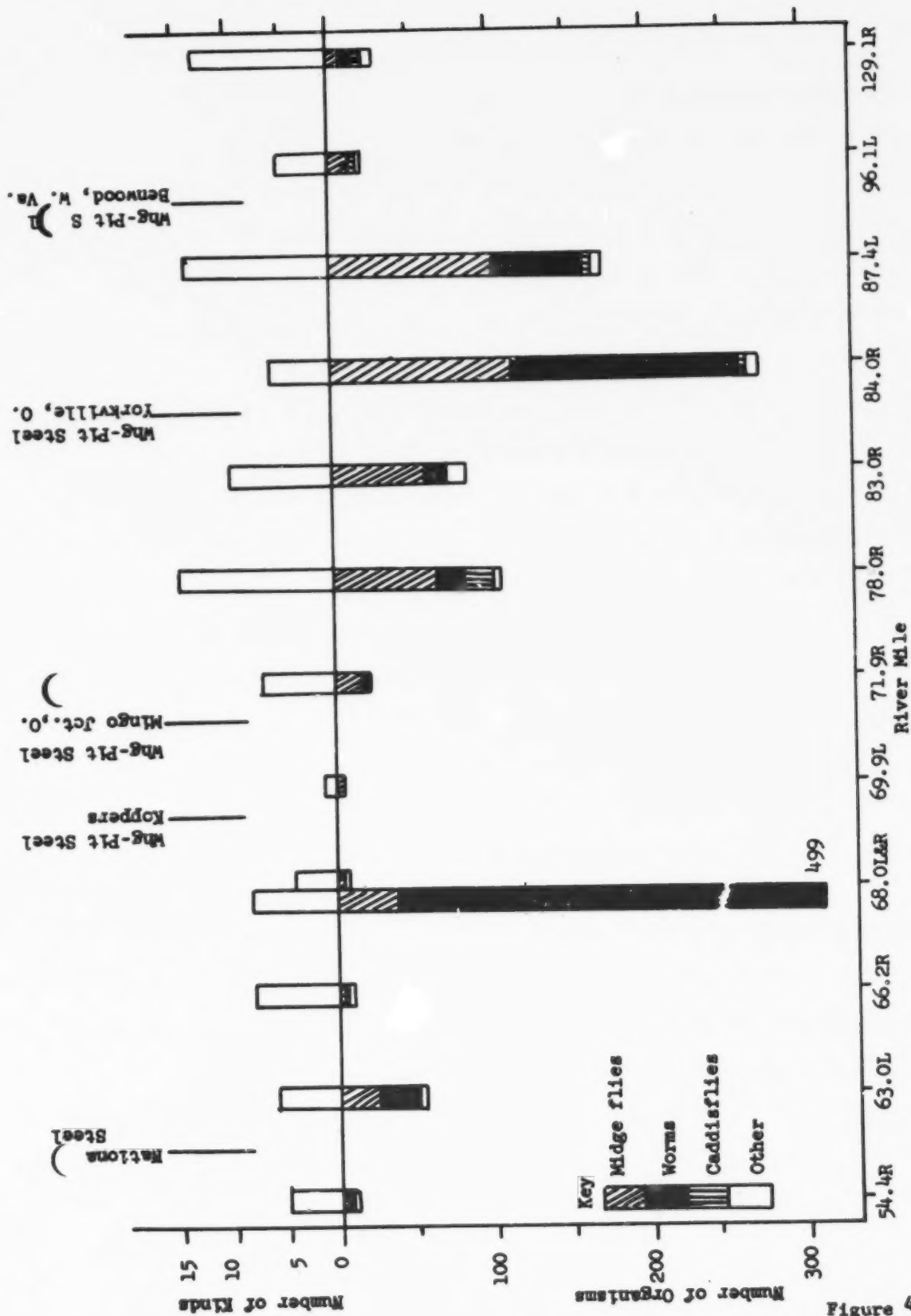
Fish held at M.P. 71.9, downstream of the Mingo Junction, Ohio industrial complex, were rated by the judges as having a strong off-flavor. At M.P. 129.1, the degree of off-flavor was rated as moderate, similar to the two uppermost stations.

BOTTOM ORGANISMS

Bottom dwelling organisms (macroinvertebrates), such as insect larvae, snails, clams, worms, etc. are useful in determining the effects of pollutants. These organisms lack a means of rapid locomotion and are thus prevented from making extended migrations. Because of their limited migration and their relatively long life cycles, bottom organisms reflect conditions at the sampling point for an extended period of time, and thus serve as indicators of prevailing water quality conditions.

Bottom organisms were collected during this study using a Peterson dredge and rock filled basket sampler. The baskets were exposed at a depth of one to two feet for a period of four weeks. These artificial substrates provided a habitat for colonization unaffected by variations in sediment or bottom materials. The results of the basket sampling are summarized in Figure 4.

In general, aquatic worms comprised a large percentage of each sample. Pollution-sensitive forms, such as mayflies and stoneflies, were absent; however, caddisflies, which are tolerant of a wide range of environmental condition, were collected at several stations. All samples collected from M.P. 54.4 to M.P. 71.9 contained relatively low numbers of organisms and limited diversity,



indicating degraded water quality. The basket sample on the left (West Virginia) bank at M.P. 69.9 contained only two midge fly larvae, indicating toxic conditions at that station. As noted earlier, this station is a short distance downstream from the Koppers Company plant at Follansbee, West Virginia. This was the poorest sample collected throughout the study area. At M.P. 78.0, diversity increased, indicating a recovery zone. This increase in diversity was also apparent, although to a lesser degree, at M.P. 83.0. Diversity decreased again at M.P. 84.0, probably as a result of discharges from the Yorkville, Ohio plant of Wheeling-Pittsburgh Steel Company.

Another increase in diversity occurred at M.P. 87.4, again indicating a partial recovery. At M.P. 96.1, downstream from the Benwood plant of Wheeling-Pittsburgh Steel, numbers and diversity were limited. However, at M.P. 129.1, diversity had again increased.

As initially stated, all samples indicated a degraded water quality. However, samples collected downstream from several of the major industrial complexes indicated areas of more serious degradation, followed in nearly every case by zones of partial recovery.

SUSPENDED ALGAE

Suspended algae (phytoplankton) occupy a position at the bottom of the food chain and are, therefore, important members of the aquatic community. An over-abundance of suspended algae indicates the presence of excessive amounts of nutrients in the water while low numbers of suspended algae generally indicate either a lack of nutrients or the presence of toxic substances.

During this study, samples were collected on July 27 and August 3 at the 12 stations designated as sampling points for chemical analyses. These samples were used for suspended algal counts and chlorophyll concentrations. The results are summarized in Figures 5 and 6.

All of the algal counts from this portion of the Ohio River fall within the range of those indicative of unproductive waters. There was a general increase in numbers as the water flowed downstream, indicating a possible increase in nutrient levels. Chlorophyll concentrations remained fairly stable throughout the study area with a slight increase in the downstream samples. These studies do not distinguish between toxic effects or lack of nutrients.

ATTACHED GROWTH

The attached growths (periphyton) are similar to the suspended algae in their environmental role. However, since they are attached instead of free floating, they reflect the prevailing water quality at a given point in the stream in much the same way as do the bottom organisms.

For this study, attached growths were collected on glass slides exposed at the surface for a four-week period in floating samplers. Four slides from each sampler were prepared for Sedgwick-Rafter counts, and each of the remaining four slides were prepared for chlorophyll analysis. The composition of the attached growths and the chlorophyll values are shown in Figures 7 and 8, respectively.

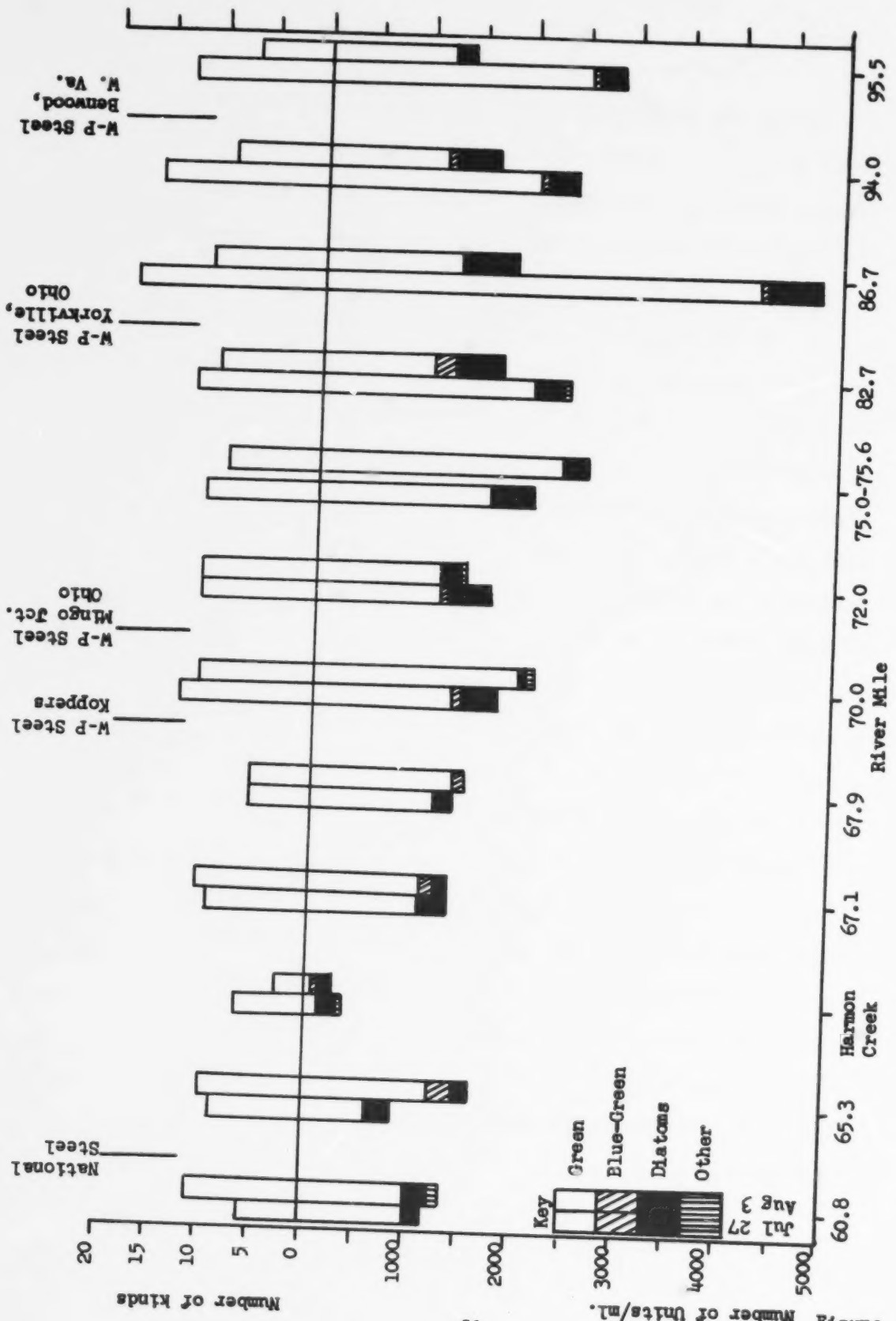
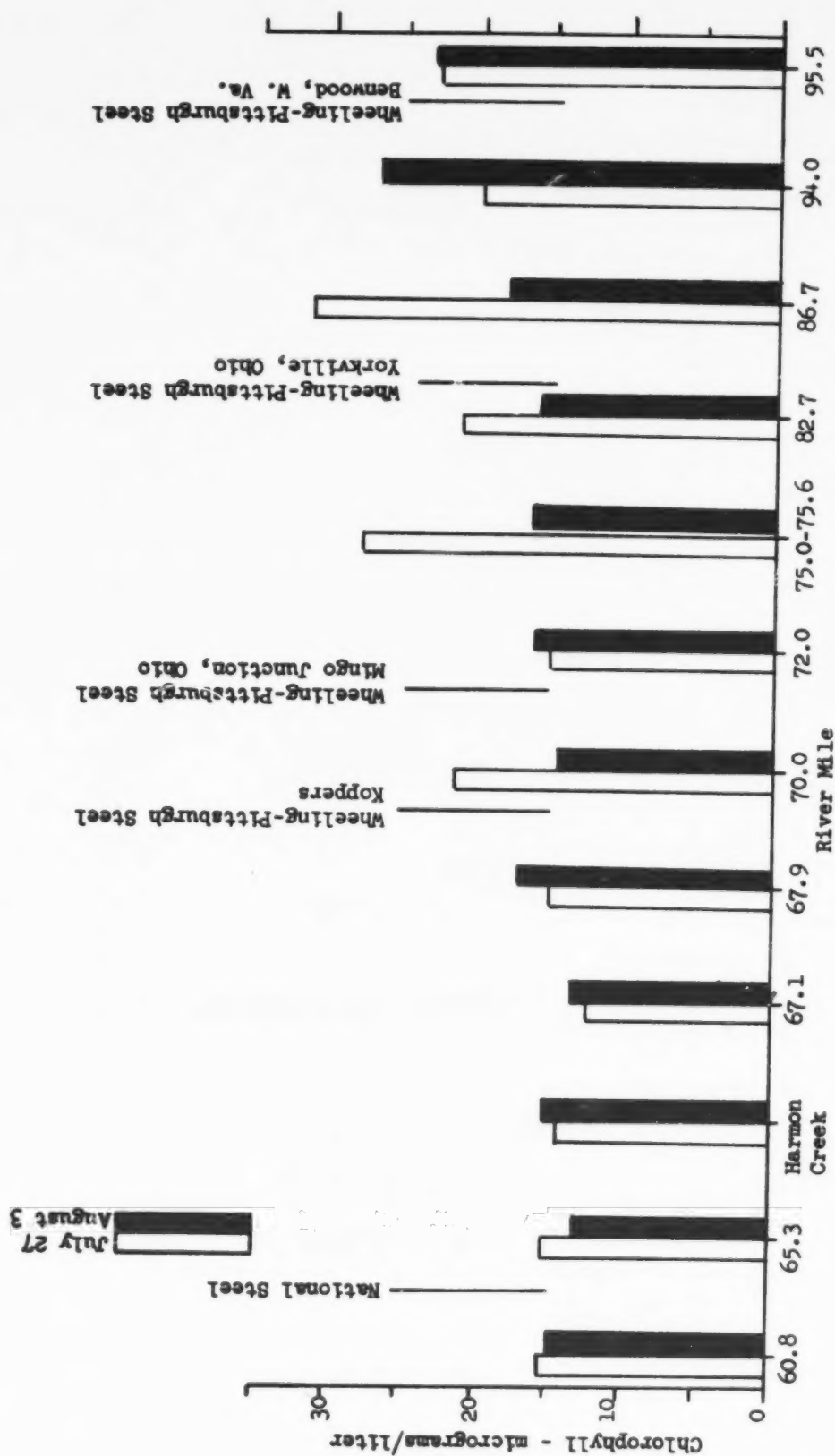


Figure 5



Concentrations of Chlorophyll in the Ohio River. July 27 and August 3, 1970

Figure 6

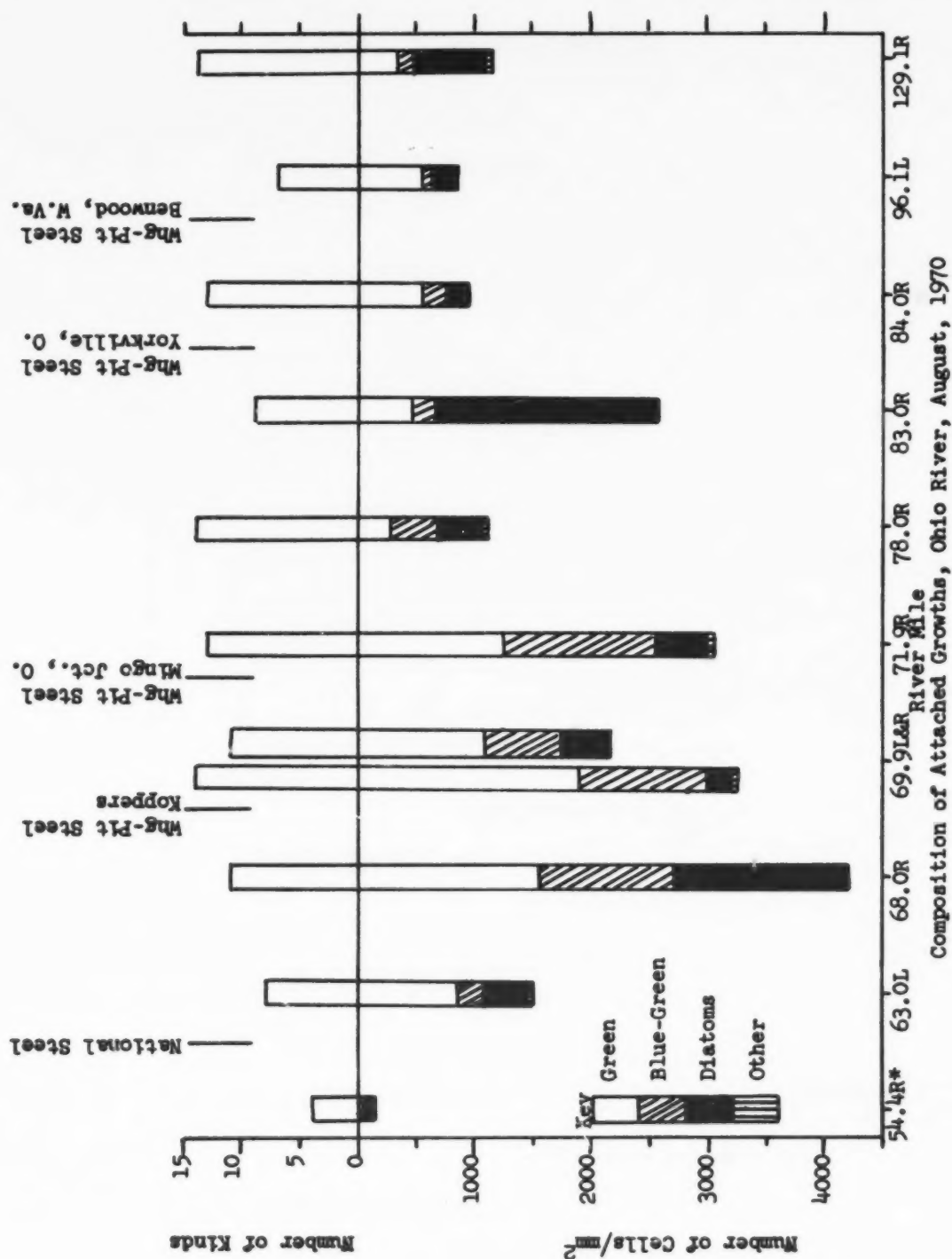


Figure 7

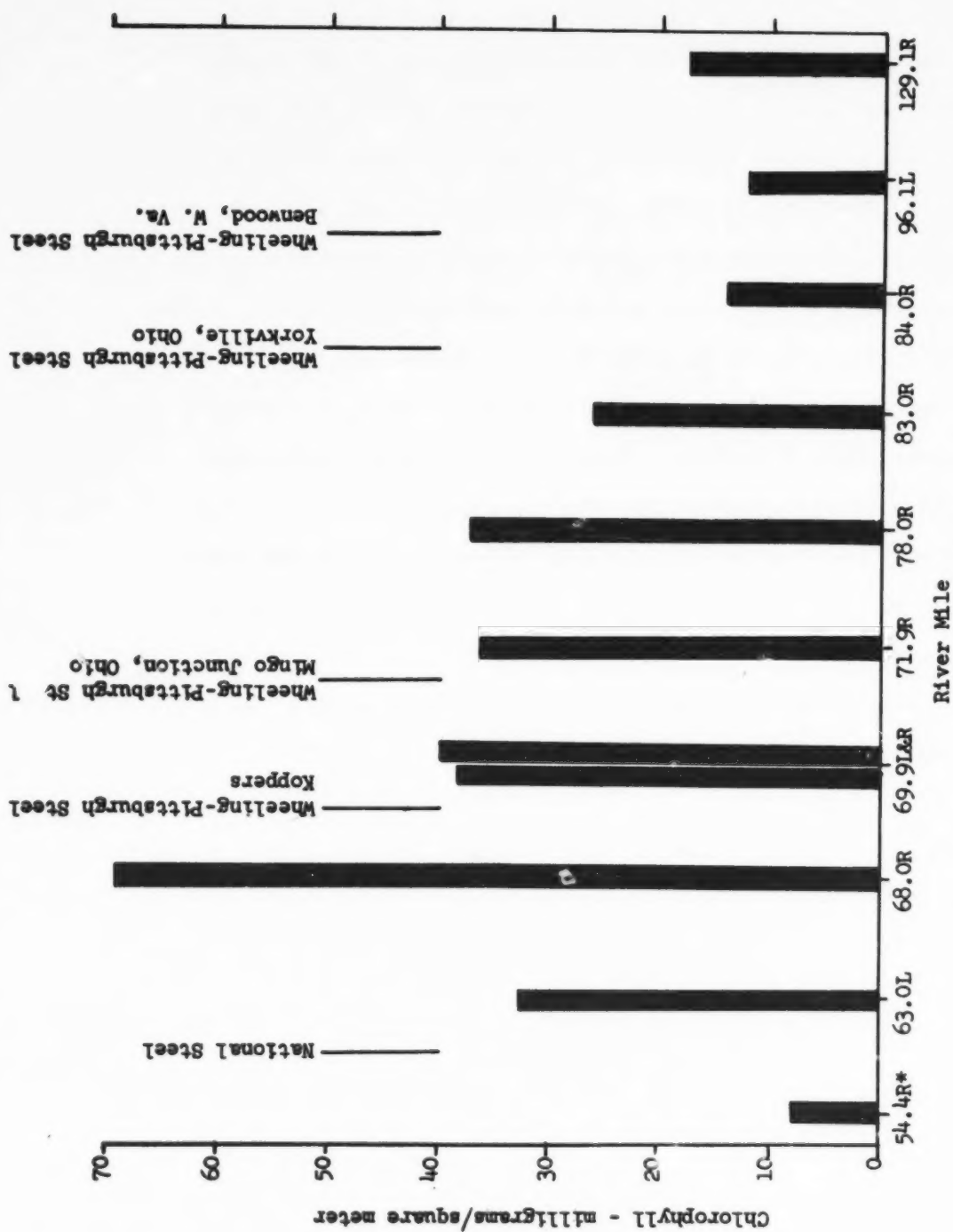


Figure 8

An examination of the data shows an increase in both numbers of cells and quantity of chlorophyll from M.P. 54.4 to M.P. 68.0, indicating a probable increase in available nutrients at the latter station. Downstream from M.P. 68.0, both total counts and quantity of chlorophyll show a gradual decline. This is indicative of either a decreasing availability of nutrients or an increasing concentration of toxic substances in the water or both. Numbers and quantity of chlorophyll decreased downstream from Koppers Company at M.P. 69.9, suggesting toxic influences.. Decreases also occurred downstream from the Yorkville plant of Wheeling-Pittsburgh Steel at M.P. 84.0 and downstream from the Benwood plant of Wheeling-Pittsburgh Steel at M.P. 96.1. These decreases were small but do suggest a prevailing presence of toxic substances in the plant effluents. At M.P. 129.1, a slight increase was evident, indicating a partial zone of recovery.

B I B L I O G R A P H Y

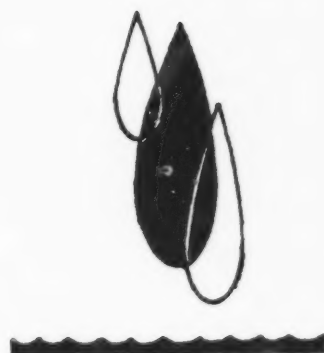
1. U. S Bureau of the Census, "U. S. Census of Population, 1970. State of Ohio - PC (VI)-37. Advance Report. January 1971.
2. U. S. Bureau of the Census, "U. S. Census of Population, 1970. State of West Virginia - PC (PI) - 50. Preliminary Report. July 1970.
3. U. S. Army Engineer Division, Ohio River. "Ohio River and Tributaries - Small Boat Harbors, Ramps, Landings, etc." Corps of Engineers, Cincinnati, Ohio. April 1969.
4. U. S. Army Engineer Division, Ohio River. "River Terminals, Ohio River and Tributaries." Corps of Engineers, Cincinnati, Ohio. April 1970.
5. "Definitions and Procedures for Application of Pollution Control Standards Numbers 1-70, 2-70." Ohio River Valley Water Sanitation Commission, Cincinnati, Ohio.
6. Krumholz, L. A., Charles, J. R., and Minckley, W. L. "The Fish Populations of the Ohio River. In: Aquatic Life Resources of the Ohio River." ORSANCO, Cincinnati, Ohio. 1962.

APPENDIX

WATER QUALITY DATA

OHIO RIVER

Wheeling, W.Va. — Steubenville, Ohio Area



This Appendix contains the water quality data collected by the Wheeling Office of Water Programs, Environmental Protection Agency, during a special study conducted in July and August 1970, on the Ohio River from Toronto, Ohio (mile point 60.0) to McMechen, West Virginia (mile point 96.1).



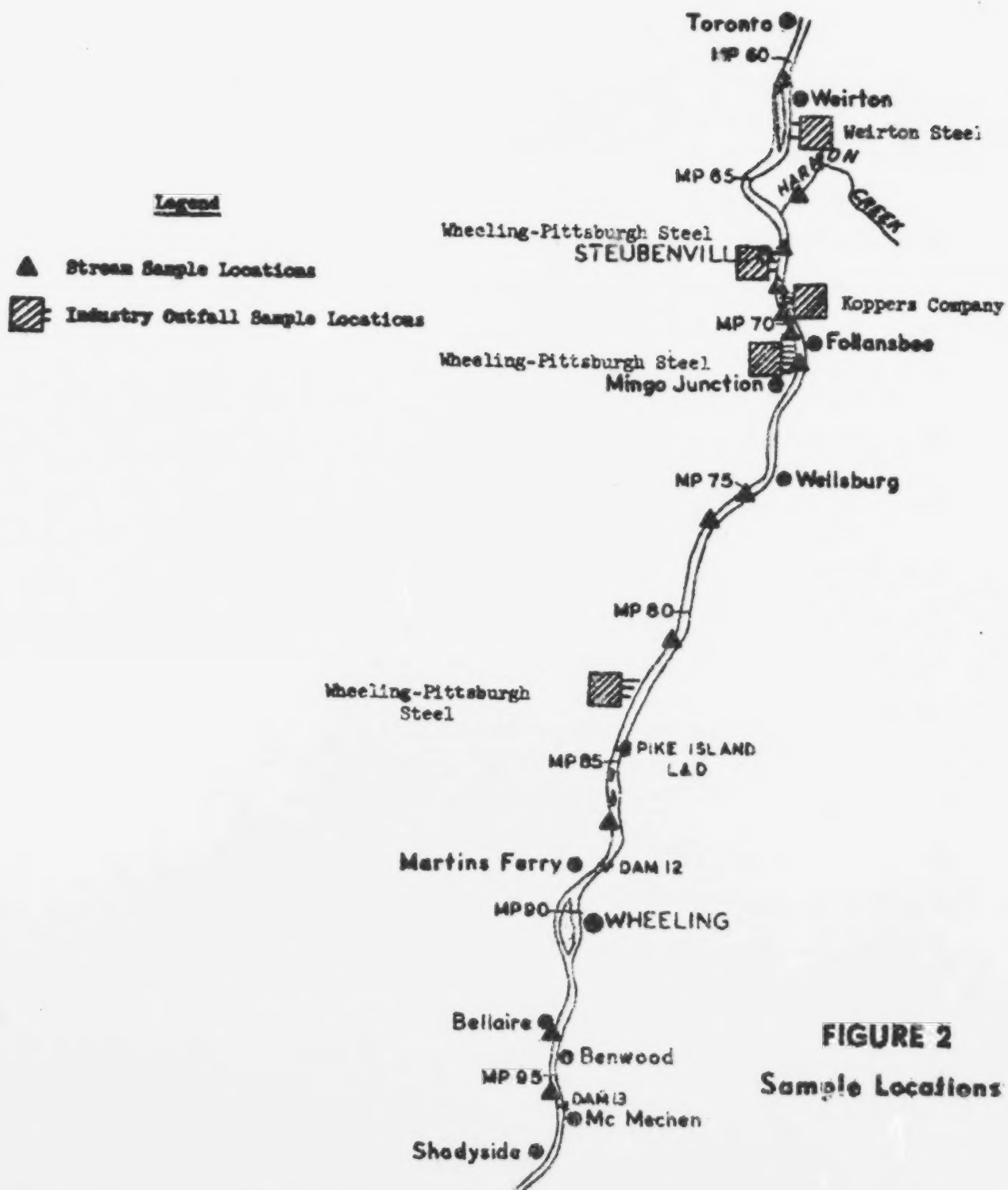


FIGURE 2
Sample Locations

SAMPLING STATIONS
SPECIAL STUDY-EPA-OHIO RIVER
July-August, 1970

<u>Description</u>	<u>Mile Point</u>
Ohio River downstream of Toronto, Ohio	60.8
Ohio River opposite Steubenville, Ohio, water intake	65.3
Harmon Creek at W. Va. Route 2 bridge	-
Ohio River upstream of Steubenville, Ohio, sewage treatment plant	67.1
Ohio River downstream of Steubenville, Ohio, sewage treatment plant	67.9
Ohio River downstream of Wheeling-Pittsburgh Steel and Koppers Company	70.0
Ohio River downstream of Follansbee, West Virginia	72.0
Ohio River downstream of Wellsburg, W. Va.	75.0
Ohio River downstream of Brilliant, Ohio sewage treatment plant	75.6
Ohio River upstream of Wheeling-Pittsburgh Steel, Yorkville, Ohio	82.7
Ohio River at Wheeling, West Virginia, raw water intake ^{1/}	86.7
Ohio River opposite Bellaire, Ohio, water intake	94.0
Ohio River upstream of Lock and Dam No. 13	95.5

^{1/} EPA Pollution Surveillance Station.

Stream Water Quality Data

Station Number 550386 - Ohio River Below Toronto, Ohio, M. P. 60.8

Date	Temp. °C	D. O. mg/l	pH	Cond. µmhos	T. Coliform Org./100 ml	F. Coliform Org./100 ml	F. Streptococcus Org./100 ml	BOD ₅ mg/l	Phenols mg/l	Cyanide mg/l	Iron mg/l	Mn mg/l	Acidity mg/l	Chromium mg/l	Arsenic mg/l	Fluoride mg/l
7-27-70	26	7.2	6.2	290	3,600	130	6	1.5	0.000	0.000	0.2	0.4	5	0	0.000	0.30
7-28-70	26.5	7.5	6.4	300	2,600	100	4	2.0	0.000	0.000	0.3	0.4	4	0	0.000	0.30
7-29-70	27	7.7	6.4	285	6,400	150	<2	1.4	0.000	0.000	0.4	0.4	5	0	0.000	0.30
7-30-70	27	7.7	7.1	360	4,100	1A	12	1.9	0.000	0.000	0.5	0.4	4	0	0.000	0.30
7-31-70	27	7.8	6.9	310	5,000	660	2	1.5	0.004	0.000	0.4	0.4	3	0	0.000	0.30
8-3-70	26	7.6	7.2	380	5,200	350	26	2.0	0.000	0.000	0.6	0.7	13	0	0.000	0.33
8-4-70	26.5	8.5	7.0	360	6,600	280	4	2.3	0.001	0.000	0.6	1.7	6	0	0.000	0.33
8-5-70	26	8.0	7.3	370	6,100	180	2	2.3	0.000	0.000	0.4	0.5	4	0	0.000	0.33
8-6-70	26.5	7.8	6.9	375	5,300	230	4	2.1	0.003	0.000	0.4	0.6	4	0	0.000	0.33
8-7-70	26.5	7.9	7.2	360	3,600	190	12	1.7	0.005	0.000	0.5	0.6	3	0	0.000	0.33

Lead
mg/l

0.020 - Composite for
Week of 7/27

0.016 - Composite for
Week of 8/3

Stream Water Quality Data
Station Number 550550 - Ohio River @ Steubenville, Ohio, M. P. 65.3

Date	Temp. °C	D. O. mg/l	Cond. µmhos	pH	T. Coliform Org./100 ml	F. Coliform Org./100 ml	F. Streptococcus Org./100 ml	BOD ₅ mg/l	Phenols mg/l	Cyanide mg/l	Iron mg/l	Mn mg/l	Acidity mg/l	Chromium mg/l	Arsenic mg/l	Fluoride mg/l
7-27-70	26.5	7.7	6.3	305	4,100	340	24	1.7	0.000	0.020	0.2	0.4	5	0		
7-28-70	27	7.3	6.3	300	5,800	160	18	2.1	0.003	0.020	0.3	0.4	10	0		
7-29-70	27.5	7.6	6.8	300	4,900	270	10	0.7	0.008	0.020	0.3	0.4	5	0		
7-30-70	27	7.4	7.0	330	5,900	LA	150	2.0	0.008	0.020	0.3	0.4	2	0		
7-31-70	27	7.0	6.9	320	5,800	350	12	1.4	0.009	0.040	0.2	0.3	4	0	0.008	Week of 7/27 Composite for
8-3-70	26	7.3	7.1	385	4,500	420	46	1.4	0.003		0.5	0.5	8	0		
8-4-70	26.5	7.5	7.0	385	6,300	400	14	1.5	0.013	0.030	0.4	0.6	5	0		
8-5-70	26	7.6	7.2	400	5,500	330	2	2.1	0.009	0.040	0.4	0.5	5	0		
8-6-70	27	6.9	7.2	380	4,600	190	22	0.9	0.003	0.020	0.3	0.6	4	0		
8-7-70	26.5	7.7	7.3	385	4,000	170	62	1.0	0.003	0.020	0.7	0.7	4	0	0.000	Week of 8/3 Composite for

Lead
mg/l

0.010 - Composite for
Week of 7/27

0.022 - Composite for
Week of 8/3

Stream Water Quality Data

Station Number 550174 - Harmon Creek @ Route 2 Bridge

Date	Temp. °C	D. O. mg/l	pH	Cond. µmhos	T. Coliform Org./100 ml	F. Coliform Org./100 ml	F. Streptococcus Org./100 ml	BOD ₅ mg/l	Phenols mg/l	Cyanide mg/l	Iron mg/l	Mn mg/l	Acidity mg/l	Chromium mg/l	Arsenic mg/l	Fluoride mg/l
7-27-70	34.5	6.4	5.8	555	320,000	3,900	770	>5.5	0.000	0.020	25.0	1.0	42	0	0.000	0.60
7-28-70	33	6.0	6.1	440	71,000	770	800	>7.4	0.001	0.020	18.0	1.2	28	0	0.000	0.60
7-29-70	36	6.3	5.8	535	40,000	2,300	2,100	>6.4	0.008	0.010	16.0	1.4	39	0	0.000	0.60
7-30-70	32	7.5	5.6	600	24,000	170	2,000	>5.0	0.004	0.010	24.0	1.4	62	0	0.000	0.60
7-31-70	34	6.0	6.3	620	26,000	1,800	1,900	>6.0*	0.004	0.010	18.0	1.3	50	0	0.000	0.60
8-3-70	31	6.5	6.1	640	420,000	76,000	1,600	16.7	0.003	0.020	36.0	1.5	90	0	0.000	0.74
8-4-70	34	6.3	6.2	600	33,000	1,400	620	14.4	0.005	0.020	20.0	1.2	46	0	0.000	0.74
8-5-70	33	7.3	3.9	750	5,500	660	180	11.8	0.004	0.010	50.0	1.3	128	0	0.000	0.74
8-6-70	36	6.0	6.4	690	66,000	12,000	6,300	21.0	0.012	0.000	28.0	1.5	51	0	0.000	0.74
8-7-70	33.5	7.5	5.0	600	3,100	200	970	3.2	0.007	0.010	25.0	1.0	61	0	0.000	0.74

* 3 day BOD

Lead
mg/l0.900 - Composite for
Week of 7/271.100 - Composite for
Week of 8/3

Stream Water Quality Data
 Station Number 550209 - Ohio River Above Steubenville, Ohio, M. P. 67.1

Date	Temperature °C	Dissolved Oxygen mg/l	pH	Conductivity umhos	Total Coliform Org./100 ml	Fecal Coliform Org./100 ml	Fecal Streptococcus Org./100 ml	BOD ₅ mg/l
7-27-70	27	7.2	6.4	335	37,000	5,100	150	1.9
7-28-70	28	7.4	6.3	360	42,000	1,800	60	2.7
7-29-70	28.2	7.3	6.5	330	14,000	760	32	1.4
7-30-70	27.5	7.4	6.9	320	21,000	1,100	480	1.2
7-31-70	27	7.4	6.8	350	6,500	210	16	1.6
8-3-70	26	6.8	7.0	400	5,400	260	18	2.9
8-4-70	26	7.5	6.9	410	4,800	370	10	3.0
8-5-70	26.5	8.0	6.7	420	3,600	260	4	>4.8
8-6-70	28	7.4	7.2	490	3,700	150	6	2.6
8-7-70	26.5	8.2	7.0	415	9,100	240	10	1.6

Stream Water Quality Data

Station Number 550376 - Ohio River Below Steubenville, Ohio, M. F. 67.9

Date	Temp. °C	D. O. mg/l	pH	Cond. µmhos	T. Coliform Org./100 ml	F. Coliform Org./100 ml	F. Streptococcus Org./100 ml	BOD ₅ mg/l	Phenols mg/l	Cyanide mg/l	Iron mg/l	Mn. mg/l	Acidity mg/l	Chromium mg/l	Arsenic mg/l	Fluoride mg/l
7-27-70	26	8.4	6.1	340	39,000	2,700	200	2.3	0.000	0.020	0.7	0.4	4	0	0.000	0.10
7-28-70	27	7.6	6.2	340	30,000	2,800	70	2.2	0.000	0.010	0.7	0.4		0	Composite for Week of 7/27	Composite for Week of 7/27
7-29-70	26.5	7.7	6.2	315	20,000	2,000	56	1.6	0.001	0.010	0.5	0.3		0		
7-30-70	26	7.2	6.5	370	48,000	3,700	860	1.0	0.000	0.010	0.5	0.4		0	Composite for Week of 7/27	Composite for Week of 7/27
7-31-70	26.8	7.6	6.6	420	6,900	290	76	1.1	0.004	0.020	0.7	0.4		0	0.000	0.10
8-3-70	27	7.0	6.4	440	27,000	1,900	570	2.0	0.001	0.000	1.4	0.5		0		
8-4-70	27	7.6	6.4	440	8,000	1,400	120	2.2	0.003	0.010	0.6	0.7		0	Composite for Week of 8/3	Composite for Week of 8/3
8-5-70	27	7.9	6.5	440	6,600	750	130	1.8	0.000	0.020	0.8	0.6		0		
8-6-70	26	8.9	6.2	450	6,500	240	12	1.4	0.001	0.030	0.6	0.6		0		
8-7-70	27	9.0	6.5	460	5,500	330	10	0.7	0.001	0.020	0.5	0.6		0	0.000	0.37

Lead
mg/l

0.010 - Composite for
Week of 7/27

0.020 - Composite for
Week of 8/3

Stream Water Quality Data

Station Number 550388 - Ohio River Below W-P & Koppers Company, M. F. 70.0

Date	Temp. °C	D. O. mg/l	pH	Cond. µmhos	T. Coliform Org./100 ml	F. Coliform Org./100 ml	F. Streptococcus Org./100 ml	BOD ₅ mg/l	Phenols mg/l	Cyanide mg/l	Iron mg/l	Mn mg/l	Acidity mg/l	Chromium mg/l	Arsenic mg/l	Fluoride mg/l
7-27-70	26.5	7.6	6.2	360	22,000	1,600	120		0.004	0.010	0.8	0.4	5	0		
7-28-70	27.2	7.8	6.3	340	24,000	1,500	20	3.3	0.030	0.030	0.6	0.4	5	0		
7-29-70	27	8.0	6.2	320	17,000	1,400	78	1.2	0.053	0.000	0.5	0.4	4	0		
7-30-70	26	7.0	6.4	320	16,000	1,200	390	0.3	0.004	0.030	0.5	0.4	15	0	Composite for Week of 7/27	Composite for Week of 7/27
7-31-70	26.5	8.2	6.6	400	6,400	320	58	3.0	0.051	0.020	0.5	0.4	7	0	0.000	0.0
8-3-70	27	7.1	6.3	430	5,100	320	16	1.5	0.021	0.020	0.7	0.5	4	0		
8-4-70	27.5	7.2	6.2	450	7,000	290	16	1.8	0.023	0.020	0.6	0.7	3	0	Composite for Week of 8/3	Composite for Week of 8/3
8-5-70	27	8.2	6.6	445	14,000	520	8	1.7	0.014	0.020	0.5	0.5	4	0		
8-6-70	26	8.8	6.2	450	24,000	2,000	32	0.7	0.012	0.040	0.6	0.5	4	0		
8-7-70	26	8.9	6.2	460	18,000	700	22	1.1	0.017	0.010	0.6	0.7	6	0	0.000	0.35

Lead
mg/l

0.025 - Composite for
Week of 7/27

0.004 - Composite for
Week of 8/3

Stream Water Quality Data
Station Number 550389 - Ohio River Below Follansbee, West Virginia, M. P. 72.0

Date	Temp. °C	D. O. mg/l	pH	Cond. umhos	T. Coliform Org./100 ml	F. Coliform Org./100 ml	F. Streptococcus Org./100 ml	BOD mg/l	Phenols mg/l	Cyanide mg/l	Iron mg/l	Mn. mg/l	Acidity mg/l	Chromium mg/l	Arsenic mg/l	Fluoride mg/l
7-27-70	27	7.5	6.2	360	19,000	1,100	10	1.9	0.000	0.010	0.8	0.4	3	0	Composite for Week of 7/27	Composite for Week of 7/27
7-28-70	26.8	7.5	6.2	350	31,000	1,200	210	1.5	0.000		0.7	0.4	5	0		
7-29-70	27.8	7.7	6.2	325	14,000	490	28	0.9	0.001	0.000	0.6	0.4	4	0		
7-30-70	27	7.2	6.3	325	16,000	1,200	590	1.1	0.001	0.010	0.7	0.4	3	0	Composite for Week of 7/27	Composite for Week of 7/27
7-31-70	27	8.2	6.6	380	12,000	450	86	2.0	0.001	0.020	0.5	0.4	4	0	0.000	0.40
8-3-70	27.5	7.1	6.2	425	5,700	180	20	2.3	0.001	0.020	0.6	0.6	6	0		
8-4-70	27.2	7.0	6.2	450	7,100	440	16	2.5	0.005	0.020	0.5	0.6	5	0	Composite for Week of 8/3	Composite for Week of 8/3
8-5-70	27	8.2	6.4	440	12,000	460	26	2.2	0.000	0.020	0.5	0.6	4	0		
8-6-70	26.5	8.4	6.2	450	8,900	600	30	2.5	0.001	0.040	0.8	0.6	4	0		
8-7-70	26	8.4	6.2	470	54,000	60	22	2.0	0.004	0.030	0.4	0.6	4	0	0.000	0.37

Lead
mg/l

0.016 - Composite for
Week of 7/27

0.004 - Composite for
Week of 8/3

Stream Water Quality Data

Station Number 550390 - Ohio River Below Wellsburg, West Virginia & Brilliant, Ohio, M. P. 75.0 (Week of July 27, 1970)
 Station Number 550555 - Ohio River Below Wellsburg, West Virginia & Brilliant, Ohio, M. P. 75.0 (Week of August 3, 1970)

Date	Temperature °C	Dissolved Oxygen mg/l	pH	Conductivity umhos	Total Coliform Org./100 ml	Fecal Coliform Org./100 ml	Fecal Streptococcus Org./100 ml	BOD ₅ mg/l
7-27-70	26	7.5	6.2	380	11,000	650	<10	1.7
7-28-70	26	7.5	6.2	360	30,000	660	40	0.9
7-29-70	27.2	8.4	6.4	350	33,000	1,200	1,000	1.4
7-30-70	27	7.0	6.2	325	14,000	990	270	0.9
7-31-70	27	7.8	6.6	400	27,000	800	300	0.9
8-3-70	27	7.7	6.5	420	5,700	390	26	1.9
8-4-70	27.2	6.7	6.2	440	11,400	650	22	1.2
8-5-70	28	8.2	6.4	445	7,300	420	12	1.6
8-6-70	26	8.4	6.2	450	8,000	460	34	1.0
8-7-70	26	8.4	6.2	440	15,000	570	48	0.8

Stream Water Quality Data

Station Number 550391 - Ohio River Above W-P Steel, M. P. 82.7

Date	Temp. °C	D. O. mg/l	pH	Cond. umhos	T. Colliform Org./100 ml	F. Colliform Org./100 ml	F. Streptococcus Org./100 ml	BOD mg/l	Phenols mg/l	Cyanide mg/l	Iron mg/l	Mn mg/l	Acidity mg/l	Chromium mg/l	Arsenic mg/l	Fluoride mg/l
7-27-70	28	8.3	6.2	400	7,400	180	6	2.5	0.000	0.000	0.5	0.6	5	0	0.000	0.40
7-28-70	27	7.2	6.2	380	2,900	62	8	1.5	0.000	0.000	0.4	0.4	5	0	0.000	0.40
7-29-70	28	7.5	6.2	360	3,400	170	2	1.6	0.000	0.000	0.4	0.4	4	0	0.000	0.40
7-30-70	28	7.1	6.2	325	3,900	250	24	1.6	0.000	0.000	0.6	0.4	4	0	0.000	0.40
7-31-70	27.8	7.4	6.6	360	6,100	230	18	1.8	0.000	0.000	0.3	0.4	5	0	0.000	0.40
8-3-70	27.5	7.1	6.7	390	4,400	210	32	1.5	0.001	0.000	0.5	0.5	10	0	0.000	0.36
8-4-70	28	6.8	6.4	430	3,800	360	18	2.3	0.003	0.010	0.6	0.7	3	0	0.000	0.36
8-5-70	29	8.0	6.4	440	3,000	98	2	1.3	0.000	0.000	0.5	0.5	9	0	0.000	0.36
8-6-70	27	9.8	6.2	460	4,500	180	10	1.5	0.001	0.000	0.5	0.5	3	0	0.000	0.36
8-7-70	26	8.9	6.2	450	4,200	90	12	1.9	0.004	0.000	0.5	0.6	2	0	0.000	0.36

Lead
mg/l0.008 - Composite for
Week of 7/270.004 - Composite for
Week of 8/3

Station Number 550147 - Ohio River @ Wheeling, West Virginia, M. P. 86.7
Stream Water Quality Data

Date	Temp. °C	D. O. mg/l	pH	Cond. umhos	T. Coliform Org./100 ml	F. Coliform Org./100 ml	F. Streptococcus Org./100 ml	BOD mg/l	Phenols mg/l	Cyanide mg/l	Iron mg/l	Mn. mg/l	Acidity mg/l	Chromium mg/l	Arsenic mg/l	Fluoride mg/l
7-27-70	25	8.4	6.3	420	17,000	130	82	2.4	0.000	0.000	0.3	0.7	6	0	Composite for Week of 7/27	Composite for Week of 7/27
7-28-70	27	7.8	6.0	380	6,000	90	6	2.0	0.000	0.000	0.8	0.6	7	0	Composite for Week of 7/27	Composite for Week of 7/27
7-29-70	27	8.5	6.1	350	4,700	38	2	1.4	0.003	0.000	0.7	0.4	4	0	Composite for Week of 7/27	Composite for Week of 7/27
7-30-70	27	8.0	6.3	350	5,300	130	24	3.6	0.001	0.000	0.8	0.4	5	0	Composite for Week of 7/27	Composite for Week of 7/27
7-31-70	27	7.5	6.3	320	5,700	110	20	3.1	0.003	0.000	0.8	0.4	6	0	Composite for Week of 7/27	Composite for Week of 7/27
8-3-70	27	7.9	6.3	400	4,400	90	50	3.7	0.000	0.020	0.6	0.5	8	0	Composite for Week of 8/3	Composite for Week of 8/3
8-4-70	26.5	8.5	6.1	380	5,000	230	18	4.0	0.001	0.000	1.0	0.6	4	0	Composite for Week of 8/3	Composite for Week of 8/3
8-5-70	27	7.3	6.2	440	5,700	160	20	2.6	0.003	0.010	0.9	0.6	6	0	Composite for Week of 8/3	Composite for Week of 8/3
8-6-70	26	6.9	6.1	500	6,800	310	100	4.3	0.001	0.010	0.9	0.6	4	0	Composite for Week of 8/3	Composite for Week of 8/3
8-7-70	26.5	6.6	6.5	420	3,100	50	18	1.8	0.003	0.010	0.6	0.5	5	0	Composite for Week of 8/3	Composite for Week of 8/3

Lead
mg/l

0.012 - Composite for
Week of 7/27

0.020 - Composite for
Week of 8/3

Station Number 550551 - Ohio River @ Balllaine, Ohio, M. P. 94.0

Stream Water Quality Data

Date	Temperature °C	Dissolved Oxygen mg/l	pH	Conductivity umhos	Total Coliform Org./100 ml	Fecal Coliform Org./100 ml	Fecal Streptococcus Org./100 ml	BOD- mg/l
7-27-70	27	8.0	6.2	410	39,000	1,400	170	2.7
7-28-70	27	7.8	6.1	400	100,000	4,800	60	2.2
7-29-70	27	7.5	6.0	365	54,000	1,600	170	1.3
7-30-70	27	7.5	6.4	420	21,000	1,300	320	4.0
7-31-70	27	7.1	6.2	340	130,000	23,000	160	2.3
8-3-70	27	7.8	6.3	410	5,900	570	46	2.4
8-4-70	26.5	8.3	6.3	440	21,000	1,000	46	2.5
8-5-70	26	7.6	6.4	460	3,900	1,400	40	1.9
8-6-70	27	7.9	6.5	480	30,000	1,100	46	2.0
8-7-70	26	7.8	6.5	480	140,000	6,700	160	2.4

Stream Water Quality Data

Station Number 550552 - Ohio River Above Lock No. 13, M. P. 95.5

Date	Temp. °C	D. O. mg/l	pH	Cond. umhos	T. Coliform Org./100 ml	F. Coliform Org./100 ml	F. Streptococcus Org./100 ml	BOD mg/l	Phenols mg/l	Cyanide mg/l	Iron mg/l	Mn mg/l	Acidity mg/l	Chromium mg/l	Arsenic mg/l	Fluoride mg/l
7-27-70	27	8.4	6.2	420	17,000	340	20	3.4	0.000	0.000	0.5	0.7	4	0	0.000	0.07
7-28-70	27	8.1	6.1	400	13,000	4,400	40	2.4	0.000		0.6	0.5	5	0	0.000	0.07
7-29-70	27.5	7.5	5.9	380	21,000	390	14	2.0	0.001	0.000	0.7	0.5	5	0	0.000	0.07
7-30-70	27	8.0	6.0	380	28,000	800	70	2.7	0.000	0.000	0.8	0.5	5	0	0.000	0.07
7-31-70	27	7.5	6.2	340	70,000	>6,000	44	2.5	0.000	0.000	0.7	0.4	6	0	0.000	0.07
8-3-70	27	7.7	6.6	400	59,000	11,000	42	2.6	0.000	0.000	0.7	0.4	4	0	0.000	0.37
8-4-70	27	8.5	6.3	420	5,900	370	8	2.7	0.003	0.000	0.7	0.5	4	0	0.000	0.37
8-5-70	26	8.0	6.2	460	10,000	530	40	1.9	0.000	0.000	0.5	0.5	6	0	0.000	0.37
8-6-70	27	7.8	6.2	490	28,000	950	30	1.7	0.003	0.010	0.8	0.6	3	0	0.000	0.37
8-7-70	26	8.2	6.5	480	16,000	1,000	50	1.8	0.001	0.010	0.6	0.5	4	0	0.000	0.37

Lead
mg/l

0.052 - Composite for
week of 7/27

0.060 - Composite for
week of 8/3

Industrial Outfall Data

W-1 - Weirton Steel, Outfall, Ohio River, M. P. 61.93

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oils mg/l	Dissolved Solids	Sup. Solid	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
<u>8-10-70</u>														
6 a.m.-2 p.m.	40	7.3		1.71	22.6	317	16	333	0.00	0.9	1.8	0.6	0.0	0.122
	40	7.2	Composite											
2 a.m.-10 p.m.	40.5	7.9	0.004	1.45	8.8	323	18	341	0.08	0.9	1.5	0.6	0.0	0.108
	40	5.7	Composite											
10 p.m.-6 a.m.	39.5		0.234	1.37	16.4	307	18	325	0.05	0.8	1.5	0.6	0.0	0.088
<u>8-11-70</u>														
6 a.m.-2 p.m.	39	7.0	0.182	1.56	Composite	283	19	302	1.10	0.8	1.6	0.5	0	0.080
	40				Composite									
2 p.m.-10 p.m.	34.5	7.0	0.241	1.44	Composite	281	17	298	0.04	0.7	1.8	0.5	0	0.065
	34.5	7.2												
10 p.m.-6 a.m.	36	6.6	0.319	1.14	55.8	290	30	320	0.04	0.9	1.5	0.5	0	0.075
<u>8-12-70</u>														
6 a.m.-2 p.m.	35	7.2		1.06	Composite	No sample received in Lab.								
	36.7	7.8	0.325											
	36	7.7												
2 p.m.-10 p.m.	35	7.4	0.286	0.49	Composite	319	21	340	0.1	0.9	4.8	0.5		0.075
	35	7.7												
10 p.m.-6 a.m.	35	7.5	0.286	0.76	22.0	305	17	322	0.1	0.9	4.2	0.5	Composite	0.080

W-3 - Weirton Steel, Outfall, Ohio River, M. P. 62.33

Industrial Outfall Data

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oils mg/l	Dissolved Solids	Sup. Solid	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
8-10-70	35	5.7												
6 a.m.-2 p.m.	35.6	3.2	10.4	0.04	27.2	355	56	411	1.7	2.6	5.0	0.6	0	0.070
2 p.m.-10 p.m.	36	3.4	10.4	0.08	28.6	440	47	487	2.3	6.4	4.3	0.6	0	0.064
	35.6	6.9	10.4											
10 p.m.-6 a.m.	37.5	6.0	0.033	0.08	27.2	421	48	469	5.0	4.8	6.0	0.6	0	0.052
8-11-70	37.5													
6 a.m.-2 p.m.	34.5	3.8	0.161	0.14	31.2	354	54	408	1.6	8.4	5.5	0.5	0	0.050
8-12-70														

Samples could not be taken because of barges on river in front of outfall.

Industrial Outfall Data

W.A. - Weirton Steel-Harmon Creek, Outfall, Ohio River, M. P. Cove Ave.

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oils mg/l	Dissolved Solids	Sup. Solids	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
<u>8/10/70</u>														
6 a.m.-2 p.m.	37 34.5 35	3.5 2.7 3.1		0.02	18.8	400	48	448	0	0.5	108.0	0.8	0	0.074
2 p.m.-10 p.m.	30.3	4.1	Composite	0.02	17.6	368	27	395	0	0.3	64.0	0.8	0	0.096
10 p.m.-6 a.m.	36 36	3.8	0.026	0.02	12.4	297	80	377	0	0.5	86.0	0.8	0	0.074
<u>8/11/70</u>														
6 a.m.-2 p.m.	38 36.5 37	3.1 3.3	Composite	Composite	Composite	258	68	326	0	0.4	64.0	0.7	0	0.125
2 p.m.-10 p.m.	35	3.5				292	61	353	0	0.4	58.0	0.7	0	0.140
10 p.m.-6 a.m.	36.5 36.5	3.0 3.1	0.007	0.01	43.6	363	104	467	0	0.4	76.0	0.7	0	0.115
<u>8/12/70</u>														
6 a.m.-2 p.m.			Composite	Composite	Composite	No sample received in Lab.								
2 p.m.-10 p.m.						587	43	630	0	0.3	60.0	0.5	Composite	0.125
10 a.m.-6 a.m.			0.005	0.02	50.8	541	43	584	0	0.3	96.0	0.8	0.003	0.420
											92.0	0.7		0.140

Industrial Outfall Data

K-1 - Koppers Company, Outfall, Ohio River, M.P. 69.45

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oils mg/l	Dissolved Solids	Sup. Solid	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
8-10-70														
6 a.m.-2 p.m.	36.7	9.8	98.80	1.63	21.4	641	57	698	0	0.4	3.0	0.3	0	0.055
	33	10.0												
2 p.m.-10 p.m.			83.20	1.10	24.8	3,526	49	3,575	0	0.5	6.2	0.2	0	0.075
10 p.m.-6 a.m.			Samples not taken because of boat being out of service											
8-11-70														
6 a.m.-2 p.m.	36	9.2	98.8	2.20	50.8	3,966	52	4,018	0.01	0.5	5.0	0.3	0	0.015
	38	9.0												
2 p.m.-10 p.m.	39	8.9	70.2	3.80	86.0	3,350	28	3,378	0	0.5	5.5	0.3	0	0.020
	39	8.2												
10 p.m.-6 a.m.	40	8.6	182.0	7.60	99.2	1,871	57	1,928	0	0.6	6.0	0.5	0	0.015
	39.5	9.5												
8-12-70														
6 a.m.-2 p.m.	69	8.2	15.60	0.85	79.2	418	38	456	0	0.4	22.6	1.0	Composite	0.025
	35.7	7.8												
2 p.m.-10 p.m.	41.5	9.9	663.00	3.46	120.6	5,460	76	5,536	0	0.8	20.0	0.2	0.010	
10 p.m.-6 a.m.	39	10.1	390.00	12.45	96.0	4,967	63	5,030	0	0.7	16.0	0.1	0.002	0.010
	41	9.5												

Industrial Outfall Data

K-2 - Koppers Company, Outfall, Ohio River, M. P. 69.44

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oil mg/l	Dissolved Solids	Sup. Solids	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
<u>8-10-70</u>														
6 a.m.-	28	7.0												
2 p.m.	36.5	7.9	0.579	0.17	6.8	352	67	419	0	0.3	2.4	0.5	0	0.030
2 p.m.-														
10 p.m.			0.072	0.11	8.2	299	24	323	0	0.3	2.0	0.5	0	0.010
8-11-70	10 p.m.-6 a.m.													
Samples not taken because of boat being out of service.														
6 a.m.-	36	7.4												
2 p.m.	36	7.4	0.0325	0.02		298	26	324	0	0.4	1.0	0.7	0	0.090
2 p.m.-	38	6.8												
10 p.m.	37	7.0	0.153	0.02		267	5	272	0	0.3	0.8	0.6	0	0.025
10 p.m.-	36	7.4												
6 a.m.	36	7.5	0.006	0.02		839	13	852	0	0.3	0.9	0.6	0	0.025
<u>8-12-70</u>														
6 a.m.-	36.7	7.1												
2 p.m.	38.3	7.2	0.007			297	11	308	0	0.4	2.1	0.5	0.003	0.020
2 p.m.-	38													
10 p.m.	38	7.8	0.754			289	17	306	0	0.4	2.6	0.6	0.002	0.015
10 p.m.-	36.5	7.4												
6 a.m.	37.1	7.3	0.182	0.03		608	18	626	0	0.3	2.8	0.6	—	0.010

Industrial Outfall Data

K-3 - Koppers Company, Outfall, Ohio River, M. P. 69.33

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oils mg/l	Dissolved Solids	Sup. Solids	Total Solids	Hazavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
<u>8-10-70</u>														
6 a.m.-	30	7.4	0.358	0.02	0.8	290	9	299	0	0.3	0.9	0.5	0	0.030
2 p.m.	32	7.2												
2 p.m.-			C 371	0.02	0.8	264	9	273	0	0.3	0.7	0.5	0	0.030
10 p.m.														
10 p.m.-														
6 a.m.														
<u>8-11-70</u>														
6 a.m.-	30	7.3	0.514			273	24	297	0	0.4	1.0	0.6	0	0.025
2 p.m.	36	7.4												
2 p.m.-	39	7.5	0.520			243	7	250	0	0.4	1.2	0.6	0	0.035
10 p.m.	42	7.2												
10 p.m.-	42	8.2	0.650			250	22	272	0.01	0.4	0.9	0.4	0	0.025
6 a.m.	41	9.2												
<u>8-12-70</u>														
6 a.m.-	43	10.4				463	231	694	0.2	0.4	1.8	0.3		0.045
2 p.m.	53.2	10.3	11.050											
2 p.m.-	55	3.4	27.625			1,417	37	1,454	0	0.4	5.6	0.6		0.045
10 p.m.	53.3	9.8												
10 p.m.-	51.5	10.9	18.525			595	35	630	0.1	0.4	5.2	0.3		0.025
6 a.m.	51.8	10.7												

Samples not taken because of boat being out of service.

Industrial Outfall Data

L-4 - Koppers Company, Outfall, Ohio River, M. P. 69.20

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oil mg/l	Dissolved Solids	Sup. Solids	Total Solids	Hexavalent (Cr+6) mg/l	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
8-10-70														
40	7.2													
6 a.m.-2 p.m.	42	7.2	3.250	0.02	0.0	294	40	334	0	0.4	1.0	0.5	0	0.020
2 p.m.-10 p.m.			5.363	0.02	7.2	302	8	310	0	0.3	1.1	0.5	0	0.065
10 p.m.-6 a.m.														
8-11-70														
44	7.0													
6 a.m.-2 p.m.	47	7.2	1.313	Composite for B-11-70	Composite for B-11-70	283	23	306	0	0.4	1.6	0.6	0	0.030
2 p.m.-10 p.m.	34 36	6.7 7.3	1.365	Composite for B-11-70	Composite for B-11-70	292	17	309	0	0.4	1.4	0.6	0	0.045
10 p.m.-6 a.m.	34.5	7.2	1.073	0.02	16.6	275	11	286	0	0.4	1.6	0.6	0	0.035
8-12-70														
40.7	7.7													
6 a.m.-2 p.m.	45 48	7.7 7.6	6.500	Composite for B-12-70	Composite for B-12-70	212	12	224	0	0.4	2.4	0.5	Composite	0.015
2 p.m.-10 p.m.	35.7 36.7	7.1 7.3	1.698	Composite for B-12-70	Composite for B-12-70	343	21	364	0	0.4	2.8	0.5		0.020
10 a.m.-6 a.m.	35.7	7.3	1.820	0.02	16.8	319	15	334	0	0.4	2.0	0.5	0.001	0.005

Samples not taken because of boat being out of service.

VP-1 - Wheeling-Pittsburgh Steel, North Steubenville, Outfall, Ohio River, M. P. 66.61
Industrial Outfall Data

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oil mg/l	Dissolved Solids	Sup. Solids	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
<u>8-10-70</u>														
6 a.m.-2 p.m.	28	6.2		0.000	41.8	492	2,060	2,552	0	0.3	50.0	1.2	0	0.195
	28	6.9												
2 p.m.-10 p.m.	29	6.6		0.000	2,368.8	812	8,002	8,814	0	0.6	340.0	2.5	0	1.300
10 p.m.-6 a.m.	30			0.000	2,842.8	469	174	643	0	0.6	300.0	1.8	0	0.090
	31													
<u>8-11-70</u>														
6 a.m.-2 p.m.	29	5.5			56.8	498	198	696	0	0.5	74.0	1.5	0	0.065
	41													
2 p.m.-10 p.m.	29	5.6			16.4	521	125	646	0	0.6	60.0	1.2	0	0.080
	26	5.2												
10 p.m.-6 p.m.	26				1,654.6	648	282	930	0	0.6	89.0	2.0	0	0.175
<u>8-12-70</u>														
6 a.m.-2 p.m.	25.6	6.5			32.4								0	
	29	3.3												
2 p.m.-10 p.m.	25.7	5.1			14,205.2	740	1,086	1,826	0	0.5	230.0	1.8	Composite	0.510
	26	5.4												
10 p.m.-6 a.m.	26	5.9			6,006.8	936	278	1,214	0	0.6	200.0	1.8	Composite	0.160
	26	3.7												

WP-2 - Wheeling-Pittsburgh Steel, North Steubenville, Outfall, Ohio River, M. P. 68.79
Industrial Outfall Data

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oil mg/l	Dissolved Solids	Sup. Solid	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
<u>8-10-70</u>														
6 a.m.-2 p.m.	28 34.5	6.9 7.2		1.75	37.4	325	9	334	0	0.6	4.0	0.5	0	0.030
2 p.m.-10 p.m.	32 35	7.0 7.2	P-10-70 Composite	1.24	3.0	303	19	322	0	0.6	4.0	0.5	0	0.065
10 p.m.-6 a.m.	36 35	6.8	0.013	0.70	9.4	250	21	271	0	0.7	4.0	0.5	0	0.030
<u>8-11-70</u>														
6 a.m.-2 p.m.	33 34 34.5	6.5 6.6		0.91		297	23	320	0	0.5	6.0	0.7	0	0.039
2 p.m.-10 p.m.	30	6.5	P-11-70 Composite	1.71	P-11-70 Composite	305	10	315	0	0.5	2.2	0.6	0	0.035
10 p.m.-6 a.m.	29.5 30	6.3 5.9	0.008	1.71	10.8	296	22	320	0	0.9	4.6	0.6	0	0.035
<u>8-12-70</u>														
6 a.m.-2 p.m.	29 30 30.7	6.2 6.1 6.2		0.87		No sample received in Lab.								
2 p.m.-10 p.m.	32 32	6.4 6.7	P-12-70 Composite	2.28	P-12-70 Composite	359	17	376	0	0.6	8.0	0.5	0	0.080
10 p.m.-6 a.m.	31	6.7	0.010	2.12	22.4	291	13	304	0	0.9	8.5	0.5	0	0.055

VP-4 - Wheeling-Pittsburgh Steel, Mingo Junction, Outfall, Ohio River, M. P. 70.73 Industrial Outfall Data

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oil mg/l	Disolved Solids	Sup Solids	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
8-10-70														
6 a.m.- 2 p.m.	34	3.8	Composite 8/10/70	0.00	20.5	572	77	649	0	0.4	54.0	2.4	0	0.080
2 p.m.- 10 p.m.			0.010	0.01	23.4	964	148	1,112	0	0.3	18.0	4.3	0	0.045
10 p.m.- 6 a.m.														
8-11-70														
6 a.m.- 2 p.m.	33 34	3.7 3.7	Composite for 8/11/70	Composite for 8/11/70	Composite for 8/11/70	828	114	942	0	0.3	31.0	3.0	0	0.100
2 p.m.- 10 p.m.	32 29	3.3 3.1				649	83	732	0	0.3	56.0	4.3	0	0.050
10 p.m.- 6 a.m.	28 33	3.9 3.6	0.003	0.01	27.6	895	133	1,028	0	0.3	30.0	3.0	0	0.045
8-12-70														
6 a.m.- 2 p.m.	34.5 34.5	3.4 3.5	Composite for 8/12/70	Composite for 8/12/70	Composite for 8/12/70	687	107	792	0	0.2	42.0	2.5	Composite	0.080
2 p.m.- 10 p.m.	35.7 33.3	3.3 3.0				918	142	1,060	0	0.2	50.0	3.5		0.025
10 p.m.- 6 a.m.	35 37	3.4 3.6	0.046	0.01	37.0	553	67	620	0	0.3	37.0	1.8	0.004	0.055

Samples not taken because of boat being out of service.

Industrial Outfall Data

WP-5 - Wheeling-Pittsburgh Steel, Minge Junction, Outfall, Ohio River, M.P. 70.83

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oils mg/l	Dissolved Solids	Sup. Solids	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
8-10-70														
6 a.m.-	32	6.9												
2 p.m.	34.5	6.9	0.001	0.02	11.8	293	13	306	0	0.35	1.8	1.1	0	0.005
2 p.m.-														
10 p.m.			0.002	0.01	9.4	287	6	293	0	0.3	2.3	1.3	0	0.005
10 p.m.-														
6 a.m.														
8-11-70														
Samples not taken because of boat being out of service.														
8-11-70														
6 a.m.-	33	6.9												
2 p.m.	33	6.7	Composite for 8-11-70	Composite for 8-11-70	25.0	272	8	280	0	0.3	2.0	0.7	0	0.045
2 p.m.-														
10 p.m.	33	7.2	Composite for 8-11-70	Composite for 8-11-70	Composite for 8-11-70	279	11	290	0	0.3	1.6	0.5	0	0.105
10 p.m.-														
6 a.m.	34.5	6.3	0.007	0.02	12.8	250	14	264	0	0.3	1.3	0.5	0	0.0504
8-12-70														
8-12-70														
6 a.m.-	26.7	7.0	Composite for 8-12-70	Composite for 8-12-70	Composite for 8-12-70	306	12	318	0	0.4	4.0	0.8	Composite	0.080
2 p.m.	29	6.9	Composite for 8-12-70	Composite for 8-12-70	Composite for 8-12-70									
2 p.m.-														
10 p.m.	28.4	6.9	Composite for 8-12-70	Composite for 8-12-70	Composite for 8-12-70	346	8	354	0	0.4	3.8	0.5	Composite	0.015
10 p.m.-														
6 a.m.	34.4	7.1	0.020	0.03	52.2	267	5	272	0	0.3	3.4	0.5	0.002	0.005

WF-7 - Wheeling-Pittsburgh Steel, Mingo Junction, Outfall, Ohio River, M. P. 71.12
Industrial Outfall Data

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oil mg/l	Dissolved Solids	Sup. Solid	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
8-10-70														
6 a.m.-	39	9.9												
2 p.m.	39	8.5	0.208	0.01	32.2	311	107	418	0	0.9	12.0	0.5	0	0.390
2 p.m.-														
10 p.m.			0.008	0.01	41.4	354	78	432	0	1.0	12.2	0.6	0	0.460
10 p.m.-														
6 a.m.														
8-11-70														
6 a.m.-	38	8.1												
2 p.m.	39		0.003	0.01	27.6	298	448	746	0	1.6	21.0	0.7	0	1.400
2 p.m.-	36	7.8												
10 p.m.	39	9.1	0.005	0.02	22.4	332	214	546	0.02	1.1	13.0	2.0	0	0.560
10 p.m.-	39	7.6												
6 a.m.	35	9.0	0.003	0.01	31.6	302	450	752	0	1.7	42.0	0.5	0	2.250
8-12-70														
6 a.m.-	40	11.1												
2 p.m.	50	9.9												
2 p.m.-	46.7	10.7												
10 p.m.	37.8	7.6												
10 p.m.-	38.5	7.3												
6 a.m.	35.7	8.6												
Composite for 8-12-70														
						623	759	1,382	0.12		54.0	1.8		2.600
						437	481	918	0.1	8.2	44.0	1.3		2.350
						225	285	510	0	2.0	37.0	0.7	0.003	1.350

Samples not taken because of boat being out of service.

VP-8 - Wheeling-Pittsburgh Steel, Mingo Junction, Outfall, Ohio River, M. P. 71.18
Industrial Outfall Data

Sample Period	Temp. C	pH	Phenols mg/l	Cyanide mg/l	Oil mg/l	Dissolved Solids	Sup. Solid	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
<u>8-10-70</u>														
6 a.m.-	41	8.6												
2 p.m.	39	9.0	0.004	0.00	18.4	546	133	679	1.5	1.2	6.0	1.0	0	0.370
2 p.m.-														
10 p.m.			0.005	0.01	7.2	501	25	526	1.4	1.0	1.6	0.6	0	0.090
10 p.m.-														
6 a.m.														
<u>8-11-70</u>														
6 a.m.-	38	10.3												
2 p.m.	37	8.7				210	238	448	1.6	1.1	4.0	0.5	0	0.270
2 p.m.-	41.5	8.9												
10 p.m.	39.5	9.9						496	1.2	1.2	1.8	0.6	0	0.090
10 p.m.-	38	7.2												
6 a.m.	38	8.2	0.000	0.02	4.4	554			2.2	1.0	2.2	0.5	0	0.185
<u>8-12-70</u>														
6 a.m.-	28.4	7.8												
2 p.m.	29	7.4				447	31	378	0.4	0.8	12.0	0.4		0.215
2 p.m.-	29	7.5												
10 p.m.	36.5	7.6				423	15	438	2.3	1.1	3.0	0.4		0.100
10 p.m.-	36.5	7.8												
6 a.m.	35.7	7.9	0.004	0.07	17.6	556	18	574	4.3	10.2	2.6	0.5	0.004	0.070

Samples not taken because of boat being out of service.

B-11-70

Composite for

B-11-70

Composite for

B-11-70

Composite for

B-11-70

Composite for

B-12-70

Composite for

B-12-70

Composite for

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B-12-70

Composite for

B-12-70

Composite for

B-12-70

Composite for

B-12-70

Composite for

B-12-70

Industrial Outfall Data

WF-9 - Wheeling-Pittsburgh Steel, Mingo Junction, Outfall, Ohio River, M. P. 71.24

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oils mg/l	Dissolved Solids	Sup. Solid	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
8-10-70														
6 a.m.-	29	7.0												
2 p.m.	30	6.9	0.003	0.02	10.6	289	22	311	0	0.6	2.2	0.7	0	0.045
2 p.m.-														
10 p.m.			0.000	0.01	13.0	292	24	316	0	0.3	2.0	0.6	0	0.045
10 p.m.-														
6 a.m.														
8-11-70														
Samples not taken because of boat being out of service.														
6 a.m.-	29	7.0												
2 p.m.	33	6.7		0.01		221	41	262	0	0.4	2.4	0.5	Composite	0.090
2 p.m.-	31	6.8												
10 p.m.	32	6.7		0.02		190	10	200	0	0.3	2.0	0.5		0.060
10 p.m.-	31	5.5												
6 a.m.	32	7.0	0.000	0.01	9.2	314	10	324	0	0.3	1.9	0.5	0	0.040
8-12-70														
6 a.m.-	26.7	6.9												
2 p.m.	28.4	6.7				224	24	248	0	0.5	11.0	0.5	Composite	0.020
2 p.m.-	31	6.8												
10 p.m.	33	6.6				243	7	250	0	0.4	5.0	0.5		0.010
10 p.m.-	33.4	6.9												
6 a.m.	31.7	6.9	0.001	0.02	35.8	253	7	260	0	0.4	6.0	0.5	0.002	0.025

Industrial Outfall Data

WP-10 - Wheeling-Pittsburgh Steel, Yorkville, Outfall, Ohio River, M. P. 83.43

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanides mg/l	Oils mg/l	Dissolved Solids	Sup. Solid	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
<u>8-10-70</u>														
6 a.m.- 2 p.m.	33 34.5	5.9 6.1	0.008	0.00	26.6	831	814	1,645	0	0.4	270.0	1.8	0	0.080
2 p.m.- 10 p.m.														
No samples taken because of barge blocking outfall.														
10 p.m.- 6 a.m.														
No samples taken because of barge blocking outfall.														
<u>8-11-70</u>														
6 a.m.- 2 p.m.						365	91	450			200.0	1.4	0	0.050
2 p.m.- 10 p.m.														
Only one half of sample taken because of different sample crews and barge docking.														
10 p.m.- 6 a.m.														
No samples taken because of barge docking.														
No samples taken because of barge docking.														
<u>8-12-70</u>														
6 a.m.- 2 p.m.	36.7 29	5.9 4.9	0.003		967.2	879	175	1,054	0	0.3	390.0	2.5	0	0.030
2 p.m.- 10 p.m.	34.5 34	4.0 5.3	0.016	0.02	4,261.6	793	187	980	0	0.4	480.0	2.3		0.045
10 p.m.- 6 a.m.														

0.02
for
8-12-70

Industrial Outfall Data

WP-11 - Wheeling-Pittsburgh Steel, Yorkville, Outfall, Ohio River, M.P. 83.5

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oils mg/l	Dissolved Solids	Cup Solid	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
<u>8-10-70</u>														
6 a.m. - 2 p.m.	30.5 36.5	2.5 2.6	0.150	0.00	10.8	419	47	466	0	0.4	120.0	1.5	0	0.065
2 p.m. - 10 p.m.	33.5	2.7	0.325	0.01	16.2	846	67	913	0	0.4	68.0	1.5	0	0.140
10 p.m. - 6 a.m.	34.0	1.9	1.235	-	-	686	240	926	0	0.4	120.0	1.5	0	0.100
<u>8-11-70</u>														
6 a.m. - 2 p.m.	Samples not taken.													
2 p.m. - 10 p.m.	36 36	2.3 1.3	1.625	B-11-70 Composite	B-11-70 Composite	1,372	32	1,404	0	0.3	116.0	2.0	0.002	0.100
10 p.m. - 6 a.m.	38	2.3	1.310	0.00	1.0	1,458	58	1,496	0	0.3	112.0	1.3	Composite	0.080
<u>8-12-70</u>														
6 a.m. - 2 p.m.	38.3 37.2	2.4 2.5	0.312	B-12-70 Composite	B-12-70 Composite	1,169	63	1,232	0	0.3	380.0	1.7	0	0.025
2 p.m. - 10 p.m.	40.5 37.2	2.5 2.1	0.754	Composite	Composite	1,486	120	1,608	0	0.3	29.0	2.7	Composite	0.025
10 p.m. - 6 a.m.	37.5 37	2.1 2.0	0.234	0.00	25.4	1,173	23	1,196	0	0.3	410.0	2.0	Composite	0.020

*Represents one single sample

Industrial Outfall Data

VP-12 - Wheeling-Pittsburgh Steel, Yorkville, Outfall, Ohio River, M. P. 83.58

Sample Period	Temp. °C	pH	Phenols mg/l	Cyanide mg/l	Oils mg/l	Dissolved Solids	Sup. Solid	Total Solids	Hexavalent (Cr+6)	Fluoride mg/l	Iron mg/l	Manganese mg/l	Arsenic mg/l	Lead mg/l
8-10-70														
6 a.m.- 2 p.m.														
2 p.m.- 10 p.m.														
10 p.m. 6 a.m.														
8-11-70														
6 a.m.- 2 p.m.			0.010	0.00	Composite for 8-11-70	3,208	338	3,546	0	0	185.0	3.0	0	0.010
2 p.m.- 10 p.m.	18 20	3.2 3.3	0.004	0.00		3,194	352	3,546	0		197.0	3.0		0.015
10 p.m.- 6 a.m.	19.5 19	1.9 3.2	0.001	0.00	29.8	3,649	337	3,986	0	C	187.0	3.2	Composite	0.020
8-12-70														
6 a.m.- 2 p.m.	17 19.5	3.0 2.9	Composite for 8-12-70	Composite for 8-12-70	Composite for 8-12-70	3,512	348	3,860	0	0.1	440.0	3.0	0.003	0.000
2 p.m.- 10 p.m.	20 20	2.7 2.8				3,570	318	3,888	0	0.1	480.0			3.4
10 p.m.- 6 a.m.	20.5 19.5	2.9 2.8	0.007	0.00	48.6	3,753	211	3,964	0	0.3	435.0	3.5	Composite	0.000

LIST OF BIOLOGICAL SAMPLING STATIONS*

Mile Point	Description
54.4	New Cumberland Locks and Dam
56.0	Below New Cumberland Locks and Dam
62.0	In the back-channel of the Ohio River around Brown Island
63.0	In the main channel around Brown Island, approximately 0.7 miles below National Steel
66.2	Old Lock and Dam #10, above Steubenville, Ohio
68.0	Left - 1.3 miles below Harmon Creek Right - 0.1 miles below Steubenville Sewage Treatment Plant
69.9	Left - 0.6 miles below Koppers Company Right - 1 mile below Wheeling-Pittsburgh Steel
71.9	Right - 0.4 miles below Wheeling-Pittsburgh Steel, Mingo Junction
78.0	Right - 1 mile below Ohio Power Company
83.0	0.2 miles above Wheeling-Pittsburgh Steel, Yorkville, Ohio
84.0	Right - 0.6 miles below Wheeling-Pittsburgh Steel, Yorkville, Ohio
87.4	Lock and Dam #12
93.4	Left - 2 miles below Wheeling Sewage Treatment Plant
96.1	Lock and Dam #13, 1.4 miles below Wheeling-Pittsburgh Steel, Benwood, W. Va.
129.1	Lock and Dam #15

*Phytoplankton samples were collected at the chemical sampling stations.

SALMONELLA STUDY

It is desirable to isolate and identify certain types of pathogenic bacteria from the bacteriological samples to verify the disease producing capacity of the bacteria. Salmonella bacteria, which cause gastrointestinal disorders, were selected. Suspected Salmonella colonies were isolated from the other bacteria present in the samples by growing the bacteria in an environment which stimulates the growth of only Salmonella bacteria. Such a selective environment is provided by the use of Selenite F broth or tetrathionate agar in the agar plates. In this test, only the tetrathionate agar supported any bacteria colonies suspected to be Salmonella. Samples of these colonies were sent to the Communicable Disease Center in Atlanta, Georgia for serological typing. These samples of bacteria colonies were identified as follows:

<u>Source</u>	<u>Salmonella Isolated</u>
Ohio River at Bellaire, Ohio intake	1. <u>Salmonella</u> enteritidis ser Typhimurium
	2. <u>Salmonella</u> enteritidis ser Panama
	3. <u>Salmonella</u> enteritidis bioser Java
	4. <u>Salmonella</u> enteritidis ser Panama
	5. <u>Salmonella</u> enteritidis bioser Java
	6. <u>Salmonella</u> enteritidis ser Panama
	7. <u>Salmonella</u> enteritidis ser Muenchen
	8. <u>Salmonella</u> enteritidis ser Panama
	9. <u>Salmonella</u> enteritidis bioser Java
	10. <u>Salmonella</u> enteritidis bioser Java
Ohio River below Steubenville, Ohio Sewage Treatment Plant	11. <u>Salmonella</u> enteritidis ser. Newport
	12. <u>Salmonella</u> enteritidis ser Thompson
	13. <u>Salmonella</u> enteritidis bioser Java
	14. <u>Salmonella</u> enteritidis ser Newport
	15. <u>Salmonella</u> enteritidis ser Thompson

BACTERIA SURVIVAL STUDY

This study was conducted to observe the bacteria survival patterns of pollution indicators and Salmonella at selected sample locations on the stretch of the Ohio River examined during this survey and to determine the effect of sewage and industrial pollution on the bacteria populations. Sewage contains nutrients for bacterial growth, and industrial wastes can have either stimulating or toxic effects on bacterial growth.

Samples were collected at two locations and filtered through a 0.22 mu membrane filter to remove all bacteria present.

Pure cultures of each of the three indicator organisms (non-fecal coliform, fecal coliform, and fecal streptococcus) as well as Salmonella were inoculated into four equal aliquots of each of the two filtered samples. They were incubated at 26.5°C (stream temperature) and counted at intervals of 1, 2, 3, 7, and 14 days. The results were calculated as percent of initial concentration remaining and recorded in Table A-I of this Appendix. To understand these results it should be remembered that the non-fecal coliforms can survive with a minimum of nutrients while the fecal coliforms, fecal streptococci, and Salmonella have more specific nutritional requirements for growth. Fecal streptococci have been generally reported to die-off somewhat rapidly in water.

The results of the sample collected below the Steubenville, Ohio waste treatment plant and the sample collected at the Bellaire, Ohio

water intake are similar. Both samples showed a regrowth of the non-fecal coliform culture and the Salmonella culture. Both samples had a slight decline in the fecal coliform culture, and both had a die-off of the fecal streptococcus culture.

The results indicate adequate nutrients were present for sustenance of the bacteria with the exception of the fecal streptococcus culture. The regrowth of non-fecal coliform and Salmonella cultures suggests no toxic effects caused by industrial wastes.

OHIO RIVER STUDY
SUMMER 1970

SURVIVAL STUDY ON TORONTO, OHIO
TO McEACHEN, WEST VIRGINIA REACH

TABLE A-I

#550551 Ohio River at Belleaire, Ohio Intake (M.P. 94.0)

CULTURE	INITIAL COUNT/100 ml	PERCENT REMAINING				
		24 HOURS	48 HOURS	72 HOURS	7 DAYS	14 DAYS
<u>Salmonella</u> <u>Java</u>	110,000	53.6	37.3	30.0	181.9	R*
Non Fecal Coliform	92,000	260.9	R*	141.3	R*	R*
Fecal Coliform	140,000	49.3	7.0	52.1	21.2	40.4
Fecal Streptococcus	44,000	14.1	0.45	0.11	<0.22	<0.22

* Regrowth = Greater than a ten-fold increase over initial number

OHIO RIVER STUDY
SUMMER 1970

SURVIVAL STUDY ON TORONTO, OHIO
TO McKECHEN, WEST VIRGINIA REACH

TABLE A-1 (Continued)

#550376 Ohio River below Steubenville, Ohio Sewage Treatment Plant (M.P. 67.9)

CULTURE	INITIAL COUNT/100 ml	PERCENT REMAINING			
		24 HOURS	48 HOURS	72 HOURS	14 DAYS
<u>Salmonella</u> <u>Java</u>	150,000	36.7	0.33	1.4	34.0 R*
Non Fecal Coliform	80,000	275.0	0.13	2.5	R*
Fecal Coliform	140,000	35.7	1.0	57.9	79.3 28.6
Fecal Streptococcus	25,000	27.2	8.4	1.6	< 0.40 <0.40

*Regrowth = Greater than a ten-fold increase over initial number

TRACE METALS STUDY

Special samples were collected at nine stations on July 27 for the purpose of making trace metal analyses. These samples were shipped to the Analytical Quality Control Laboratory in Cincinnati for the analyses.

Iron values exceeded 1.0 mg/l in two samples. High levels of manganese and aluminum generally accompanied the high iron values. Zinc was observed frequently with lesser occurrences of copper, nickel, lead and chromium. Boron, barium and strontium were found in all samples, however, cadmium, arsenic, beryllium, cobalt and vanadium were not detected in any samples. Mercury exceeded 0.5 micrograms per liter in two samples.

A complete tabulation of the data is shown in Table A-II of this Appendix.

Table A-II

Trace Metal Analyser

July 27, 1970

All Results in ug/l (ppb)

Mile Point

Trace Metal	60.8	65.3	Harmon Creek	67.9	70.0	72.0	82.7	86.7	95.5
Zinc	< 20	114	120	32	110	108	66	84	300
Cadmium	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Arsenic	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
Boron	68	78	1280	92	230	74	230	94	106
Phosphorus	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Iron	370	480	2000	820	1540	920	320	750	720
Molybdenum	< 40	< 40	88	< 40	90	< 40	96	< 40	72
Manganese	124	210	940	142	350	210	230	200	216
Aluminum	< 40	40	740	< 40	152	< 40	88	50	90
Beryllium	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Copper	< 10	< 10	< 10	< 10	15	< 10	19	16	12
Silver	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Nickel	< 20	< 20	< 20	< 20	24	< 20	24	< 20	< 20
Cobalt	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Lead	< 40	< 40	74	< 40	61	< 40	60	< 40	< 40
Chromium	< 10	< 10	< 10	< 10	12	< 10	12	< 10	< 10
Vanadium	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40
Barium	23	76	30	41	125	60	104	80	106
Strontium	25	64	30	32	165	49	192	88	148
Mercury	< 0.5	< 0.5	0.7	0.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

AQUATIC LIFE

Bottom organisms were collected during the study of July-August, 1970, using a Petersen dredge and rockfilled basket samplers. The baskets were exposed at a depth of one to two feet for four weeks. Upon retrieval, the rocks were emptied into a tub of water and each rock was brushed to remove the clinging organisms. The samples were concentrated on a sieve, preserved and taken to the laboratory for identification. The results of the bottom and basket sampling are shown in Table A-IIIF.

During this study, one liter water samples were collected on July 27 and August 3 for phytoplankton analysis at the 12 stations designated as sampling points for chemical analyses. Upon receipt in the laboratory, each sample was divided into two portions, one being prepared and used for a Sedgwick-Rafter count and the remainder was prepared and used for a chlorophyll determination using a Bausch and Lomb Spectronic 20. The results of the suspended algal counts and the chlorophyll concentrations are shown in Tables A-IV, V and VI.

For this study, attached growths were collected on glass slides exposed at the surface for a four week period in floating samplers. Four slides from each sampler were prepared for Sedgwick-Rafter counts, and each of the remaining four slides were prepared for chlorophyll analysis. The composition of the attached growths is shown in Table A-VII and the chlorophyll values are shown in Table A-VIII.

TABLE A-III

Macroinvertebrates Collected from the Ohio River
by Dredge and Basket Samplers - July-August 1970

Organism	Individuals/Basket or Dredge									
	Mile Point	54.4	56.0	62.0	63.0	66.2				
	Sampler	B	D	D	D	B	D	B		
	Location	R	L M R	R	L	L	L M R	R		
CRAZFISH										
Cambarinae										
Orconectes sp.		1								2
FLATWORMS										
MIDGE FLIES										
Chironominae										
Chironomus sp.			3							
C. (Dicrotendipes) sp.				4						
Orthocladinae										
Cricotopus sp.		2				2				1
Psectrocladius sp.		1		3		24	1 6 1			2
Tanypodinae										
Pentaneura sp.			1							1
AQUATIC WORMS		3	21 54	3	154	26	103 1 9			2
WATER FLEAS		X				X				X
HYDROIDS										
Hydra sp.			X	X		X	X X			
BRYOZOA										
Plumatella sp.			X	X	X					X
Umatella sp.										X
Number of Organisms		8	22 5 54	10	154	58	104 32 11			8
Number of Taxa		5	2 4 1	5	2	6	2 6 4			8

Key: B = Basket Sampler
 D = Petersen Dredge
 L = Left
 M = Middle
 R = Right
 X = Present

} Location in
 River facing
 downstream

TABLE A-III

Organism	Mile Point	68.0						69.9				
	Sampler	D			B			D			B	
	Location	L	M	R	L	R		L	M	R	L	
DAMSELFLIES												
Coenagrionidae												
<u>Ischnura sp.</u>						1						
CRAYFISH												
Cambarinae						1						
<u>Orconectes sp.</u>						2						
FLATWORMS										3		
ROUNDWORMS										13		
SNAILS												
Physidae												
<u>Physa sp.</u>										1		
MIDGE FLIES												
Chironominae			1									
Chironomus sp.						2						
<u>C. (Dicrotendipes) sp.</u>			1									
Orthocladinae												
Cricotopus sp.						5						2
<u>Psectrocladius sp.</u>						28	2					
Tanypodinae												
Pentaneura sp.						4			1			
<u>Procladius sp.</u>				3								
AQUATIC WORMS		121	9	88	460	1		44	13	12		
LEECHES			1									
WATER FLEAS						X						
HYDROIDS												
<u>Hydra sp.</u>		X			X					X		
BRYOZOA			X		X					X		
Number of Organisms		121	12	91	499	7		44	14	29		2
Number of Taxa		2	4	2	8	4		1	2	6		1

TABLE A-III

Organism	Mile Point	71.9				78.0				83.0			
	Sampler	D		B		D		B		D		B	
	Location	L	M	R	P	L	M	R	R	L	M	R	R
CADDISFLIES													
Psychomyiidae													
Cyrnellus sp.													
Hydroptilidae													
DAMSELFLIES													
Coenagrionidae													
Argia sp.													
CRAYFISH													
Cambarinae													
Orconectes sp.													
FLATWORMS													
SNAILS													
MIDGE FLIES													
Chironominae													
Chironomus sp.													
C. (Dicrotendipes) sp.													
C. (Cryptochironomus) sp.													
C. (Einfeldia) sp.													
C. (Endochironomus) sp.													
Polypedilum sp.													
Orthoclaadiinae													
Cricotopus sp.													
Psectrocladius sp.													
Tanypodinae													
Pentaneura sp.													
AQUATIC WORMS													
LEECHES													
WATER FLEAS													
HYDROIDS													
Hydra sp.													
Cordylophora sp.													
BRYOZOA													
Number of Organisms		15	71	12	21	153	123	37	106	26	75	29	84
Number of Taxa		6	5	1	7	1	3	2	15	3	2	1	10

TABLE A-III

Organism	Mile Point	84.0		87.4				93.4		
	Sampler	D	B	D		B	D			
	Location	R	R	L	M	R	L	L	M	R
CADDISFLIES										
Psychomyiidae										
Cyrnellus sp.							3			1
Hydroptilidae										
Hydroptila sp.			2							
Hydropsychidae									1	
DAMSELFLIES										
Coenagrionidae			2							
Argia sp.			2				1			
FLATWORMS										
				3			3			
CLAMS										
Sphaeriidae						1.				
Corbiculidae										
Corbicula sp.				1						1
MIDGE FLIES										
Chironominae										
Chironomus										
(Dicrotendipes) sp.							10			
C. (Cryptochironomus) sp.							6			
C. (Einfeldia) sp.			102							
Polypedilum sp.							6			
Orthocladiinae										
Cricotopus sp.							16			
Paectrocladius sp.							43			
Tanypodinae										
Pentaneura sp.			16				24	6		
Procladius sp.						3				
AQUATIC WORMS		10	150	51	4		58	112		24
LEECHES							1	18		
WATER FLEAS			X	X			X			
HYDROIDS										
Hydra sp.							X			
BRYOZOA							X			
Number of Organisms		10	274	55	5	3	171	136	1	26
Number of Taxa		1	6	4	2	1	14	3	1	3

TABLE A-III

Organism	Mile Point	96.1				129.0			
	Sampler	D		B		D		B	
	Location	L	M	R	L	L	M	R	R
CADDISFLIES									
Psychomyiidae									8
Cyrnellus sp.									
Hydropsychidae					2				3
Hydropsyche sp.									
Potamyia sp.									
MAYFLIES									
Baetidae									1
Tricorythodes sp.									
DAGONFLIES									
Libellulidae									2
Neurocordulia sp.									
CRAYFISH									
Cambarinae					1				
Orconectes sp.									
CLAMS									
Sphaeriidae						1	7		
Corbiculidae					1				
Corbicula sp.									
SNAILS									
Physidae									4
Physa sp.									
MIDGE FLIES									
Chironominae									
Chironomus sp.							1		1
C. (Dicrotendipes) sp.									2
C. (Cryptochironomus) sp.						9			
C. (Chironomus) sp.						9			
Polypedilum sp.					2				2
Tanytarsus sp.									
Orthocladiinae									1
Cricotopus sp.					9				
Psectrocladius sp.					5				
Tanypodinae						85		7	3
Pentaneura sp.								1	
Procladius sp.								1	
Coelotanypus sp.									
AQUATIC WORMS		32	6	6		1500	4	165	4
LEECHES		3	4					9	X
WATER FLEAS							X		
HYDROIDS									X
BRYOZOA									
Number of Organisms		35	10	7	19	1603	6	191	32
Number of Taxa		2	2	2	5	4	4	7	13

TABLE A-IV
Phytoplankton Grab Samples Collected from the Ohio River
on July 27, 1970
Sedgwick-Rafter Data
(Units/ml)

Organism	Sta. No.	386	550	174	209	376	388	389	390	391	147	551	552
	M. P.	60.8	65.3	*	67.1	67.9	70.0	72.0	75.0	82.7	86.7	94.0	95.5
COCROID BLUE-GREEN													
<u>Agmenellum sp.</u>							57	57			57	57	57
<u>Synechococcus sp.</u>							57						
COCROID GREEN													
<u>Acanthosphaera sp.</u>			57							57	171		
<u>Actinastrum sp.</u>	57			28								57	171
<u>Ankistrodesmus sp.</u>				28	114	171	171	342	171	627	1197	339	741
<u>Chlorococcum sp.</u>				28	57		114		342		171	114	285
<u>Chodatella sp.</u>					57		57					114	
<u>Closteriopsis sp.</u>					57			114		57	114	57	57
<u>Coelastrum sp.</u>								114		57	114	171	57
<u>Co smarium sp.</u>			57										
<u>Crucigenia sp.</u>			57		57	114		57		114	57	114	
<u>Dictyosphaerium sp.</u>					57				114		114	57	57
<u>Mimorphococcus sp.</u>							57						
<u>Plakatothrix sp.</u>											57		
<u>Francelia sp.</u>											114		
<u>Golenkinia sp.</u>			57				57	57	57				
<u>Micractinium sp.</u>	228				57	285	171	57	114		342	171	228
<u>Oocystis sp.</u>							114				114		
<u>Pediastrum sp.</u>	57	114	28				57		57	114	57		
<u>Scenedesmus sp.</u>	171				285	342	285	285	171	285	513	228	171
<u>Sphaerocystis sp.</u>			57							171			
<u>Staurastrum sp.</u>												57	
<u>Tetrastrum sp.</u>									114		114	57	228
unknown	513	228			342	285	228	171	513	570	969	456	513
GREEN FLAGELLATES													
<u>Trachelomonas sp.</u>				28						57			
LIVE CENTRIC DIATOMS	114	171	56	228	171	342	285	228	228	342	171	171	
LIVE PENNATE DIATOMS		57	168					114	114	57	171	114	57
Total Live Algae		1140	855	364	1311	1368	1767	1653	2052	2394	4788	2394	2793

Harmon Creek

TABLE A-V
Phytoplankton Grab Samples Collected from the Ohio River
on August 3, 1970
Sedgwick-Rafter Data
(Units/ml)

Organism	Sta. No.	386	550	174	209	376	388	389	555	391	147	551	552
	M. P.	60.8	65.3	*	67.1	67.9	70.0	72.0	75.6	82.7	86.7	94.0	95.5
COCCOID BLUE-GREEN													
<u>Anacystis sp.</u>												57	
<u>Raphidiopsis sp.</u>			228	57	114	114				171			
COCCOID GREEN													
<u>Ankistrodesmus sp.</u>	57	228					684	114	627		114	114	57
<u>Chlorococcum sp.</u>	342				114			114	57		228		57
<u>Chodatella sp.</u>					57								
<u>Closteriopsis sp.</u>	57	57			114		171	57		114			
<u>Coelastrum sp.</u>									114	57	57		
<u>Crucigenia sp.</u>								57					
<u>Dictyosphaerium sp.</u>								57			171		
<u>Golenkinia sp.</u>	57	57			57	171	57						
<u>Micractinium sp.</u>	114	228			114	399	399	57	342	171	228	228	285
<u>Oocystis sp.</u>	114										114		
<u>Pediastrum sp.</u>							57					57	
<u>Scenedesmus sp.</u>	228	285		57	285	456	171	228	570	171	171	342	285
<u>Sphaerocystis sp.</u>								57					
<u>Tetrastrum sp.</u>		57			57	57	114		285	57	57	114	
<u>Treubaria sp.</u>		57					57			171			114
Unknown	57	228			285	285	285	456	342	342	171	285	399
GREEN FLAGELLATES													
<u>Trachelomonas sp.</u>	57						57	57					
LIVE CENTRIC DIATOMS	114	171			57		57	171	57	399	342	399	171
LIVE PENNATE DIATOMS	114			171	57				171	57	171	57	
Total Live Algae		1311	1596	285	1311	1482	2109	1425	2565	1710	1824	1653	1368

*Harmon Creek

TABLE VI

Phytoplankton Chlorophyll from the Ohio River
July-August 1970

Station Number	Mile Point	Total Chlorophyll ($\mu\text{g/l}$)	
		7-27	8-3
386	60.8	15.20	14.89
550	65.3	15.48	13.13
174*		14.40	15.31
209	67.1	12.67	13.73
376	67.9	15.20	17.23
388	70.0	21.79	14.75
389	72.0	15.20	16.27
390	75.0	28.00	
555	75.6		16.41
391	82.7	21.35	16.00
147	86.7	31.53	18.07
551	94.0	20.02	27.03
552	95.5	23.03	23.39

*Harmon Creek

TABLE VII
 Periphyton Samples Collected from the Ohio River during
 August 1970
 Sedgwick-Porter Data
 (Cells/ mm^2)

Organism	Inclusive Dates	*	7/8-	7/8-	7/9-	7/9-	7/9-	7/9-	7/9-	7/9-	7/10-	7/10-
	Location	8/5	8/5	8/5	8/7	8/7	8/7	8/5	8/6	8/6	8/6	8/5
	M. P.	R	L	R	L	R	R	R	R	R	L	R
COCCOID BLUE-GREEN		54.4	63.0	68.0	69.9	69.9	71.9	72.0	63.0	84.0	96.1	129.1
<u>Anacystis sp.</u>												
<u>Raphidiopsis sp.</u>			8		81		8	10	23	4		6 13
FILAMENTOUS BLUE-GREEN												
<u>Anabaena sp.</u>			149	215	243	97	267	329	68	158	88	124
<u>Arthrospira sp.</u>					16							
<u>Lyngbya sp.</u>								64				
<u>Oscillatoria sp.</u>		43	79	975	745	575	1036		113	57	16	24
COCCOID GREEN												
<u>Actinastrum sp.</u>				55						25		
<u>Ankistrodesmus sp.</u>				33	81	49	32	19				
<u>Closteriopsis sp.</u>												2
<u>Closterium sp.</u>			9					6		4		3
<u>Coelastrum sp.</u>										182		24
<u>Cosmarium sp.</u>								6	5	4		
<u>Crucigenia sp.</u>				45								
<u>Dictyosphaerium sp.</u>							32			41		
<u>Dimorphococcus sp.</u>				760								
<u>Microactinium sp.</u>					162		32					
<u>Pediastrum sp.</u>												
<u>Scenedesmus sp.</u>			16	128	129	97	161	73	108	126	84	11 45
<u>Schroederia sp.</u>						32						
<u>Tetrastrum sp.</u>				45	64	32	32	13		16		
Unknown					162							
FILAMENTOUS GREEN												
<u>Microspora sp.</u>		18	700	400	1262	721	923			114	400	94
<u>Spirogyra sp.</u>					32	97	24		14		21	
<u>Ulothrix sp.</u>						41						
Unknown			118	45				160	315			128
GREEN FLAGELLATES												
<u>Chlamydomonas sp.</u>								3				3
<u>Lepocinclis sp.</u>							6					
<u>Trachelomonas sp.</u>					16			16				
PROTOZOA												
<u>Porticella sp.</u>								3				
LIVE CENTRIC DIATOMS				704	32	113	146	16	23	110	21	32
LIVE PENNATE DIATOMS		43	417	802	227	284	324	373	1915	102	206	637
Total Live Algae		104	1426	4207	3252	2138	3025	1091	2584	943	856	1146

*Material scraped from lock wall

TABLE A-VIII
Periphyton Chlorophyll from the Ohio River
July-August 1970

Mile Point	Location	Inclusive Dates	Number of Replicates	Total Chlorophyll* ($\mu\text{g}/\text{M}^2$)
54.4	Right	8-5**	2	7.99
63.0	Left	7-8 to 8-5	4	32.59
68.0	Right	7-8 to 8-5	1	69.17
69.9	Left	7-9 to 8-7	4	38.01
69.9	Right	7-9 to 8-7	4	39.44
71.9	Right	7-9 to 8-7	4	36.56
78.0	Right	7-9 to 8-5	4	37.61
83.0	Right	7-9 to 8-5	4	26.11
84.0	Right	7-9 to 8-6	4	13.80
96.1	Left	7-10 to 8-6	4	22.24
129.1	Right	7-10 to 8-6	3	27.33

* Average for station

** Material scraped from lock wall

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MR. CANTOR: Before I move into the report, I believe it would be helpful to indicate briefly the reason the EPA called this conference at this particular time.

The primary responsibility for the abatement or control of pollution of the waters within a State belongs to the State, of course. The Federal Government intervenes only when the pollution of interstate or navigable waters in or adjacent to any State or States endangers the health or welfare of any persons.

On the basis of intensive studies conducted during August of 1970 and supported by subsequent investigations conducted periodically in 1971, it is the conclusion of the Environmental Protection Agency that the waters of the Ohio River are polluted, that this pollution is causing degradation of interstate waters involving the States of Ohio and West Virginia, and that such pollution is subject to abatement under section 10d of the Federal Water Pollution Control Act, as amended.

It is recognized that many governmental agencies and industries have been working on this pollution problem for years and the results of their efforts are evident up and down this valley. Sewage treatment plants exist at most of the municipalities, and wastewater treatment facilities exist at many industries. The cost of these

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facilities is in the millions of dollars.

Table I, appended to this statement, is a listing of sewage treatment plant projects in the conference area in which the Federal Government has participated in the form of construction grants, under Public Law 660. Since the program was initiated in 1956, the Federal Government has granted a total of \$3.1 million from Public Law 660 funds for the construction of 14 municipal sewage treatment plant projects. Twelve of these projects are completed. Two projects, in West Virginia, those for Wellsburg and Ohio County Public Service District, are inactive, despite the fact that Federal funds have been made available.

At present there are no applications by the municipalities in the conference area for construction grant funds from the Environmental Protection Agency.

A further indication of Federal financial support is presented in Table 2, Summary of Federal Water Pollution Control Act, Section 7 - Grants for Water Pollution Control (Ohio, West Virginia and ORSANCO). Since fiscal year 1968, the Federal Government has supported Ohio, West Virginia, and ORSANCO with grants totaling \$3.6 million, as provided under section 7 of the Federal Water Pollution Control Act, as amended.

TABLE I
Public Law 660 - Construction Grants

<u>MUNICIPALITY</u> <u>(W.VA.)</u>	<u>PROJECT</u> <u>NUMBER</u>	<u>PROJECT</u> <u>STATUS</u>	<u>TOTAL</u> <u>PROJECT</u> <u>CBST</u>	<u>FEDERAL</u> <u>GRANT</u> <u>AMOUNT</u>	<u>GRANT</u> <u>DATE</u>	<u>TYPE OF</u> <u>CONSTRUCTION</u>	<u>TREATMENT</u>
FOLLANSBEE	105	COMPLETED	745,802	223,740	12/63	NEW S.T.P.	SECONDARY & CHLORINATION
BENWOOD	34	COMPLETED	547,601	164,280	11/60	NEW WASTE STABILIZATION PONDS AND APPURTENANCES	SECONDARY & CHLORINATION
WEIRTON	15 120	COMPLETED COMPLETED	1,448,061 73,410	250,000 22,023	2/58 5/65	NEW S.T.P. DUMPING STATIONS AND MAINS	PRIMARY & CHLORINATION
WHEELING	17 71	COMPLETED COMPLETED	1,681,612 62,000	250,000	7/58	NEW S.T.P. AND OUTFALL NEW AND EXTENSIONS- INTERCEPTORS	PRIMARY & CHLORINATION
OHIO CO. PUBLIC SERVICE DISTRICT (WHEELING)	138	GRANT APPROVED	1,369,000	410,700	6/67	NEW & EXTENSIONS-STP, OUTFALL, INTERCEPTORS	
WELLSBURG	118	GRANT APPROVED	1,155,500	381,310	4/65	NEW & EXTENSIONS-STP INTERCEPTOR -NOTHING DONE-	NONE
MC MECHEN & BEECH BOTTOM		NO GRANTS					
				<u>SUBTOTAL</u>		1,701,333	
				<u>TOTAL</u>		3,095,513	

<u>MUNICIPALITY</u> (OHIO)	<u>PROJECT</u> <u>NUMBER</u>	<u>PROJECT</u> <u>STATUS</u>	<u>TOTAL</u> <u>PROJECT</u> <u>COST</u>	<u>FEDERAL</u> <u>GRANT</u> <u>AMOUNT</u>	<u>GRANT</u> <u>DATE</u>	<u>TYPE OF</u> <u>CONSTRUCTION</u>	<u>TREATMENT</u>
TORONTO	20	COMPLETED	836,740	115,754	11/59	STP & INTERCEPTOR	ALL PRIMARY WITH CHLORINATION
STUEBENVILLE	270	COMPLETED	204,022	67,320	7/66	EXTENSION OF INTERCEPTOR	
MINGO JUNCTION	78	COMPLETED	615,328	104,598	5/58	STP & INTERCEPTOR	
BRILLIANT	72	COMPLETED	163,549	49,065	6/58	STP & INTERCEPTOR	
RAYLAND	169	COMPLETED	26,300	7,550	3/63	STP & INTERCEPTOR	
TILTONSVILLE	8	COMPLETED	230,238	53,850	12/57	STP & INTERCEPTOR	
YORKVILLE	36	COMPLETED	342,861	96,630	3/57	STP, OUTFALL & INTERCEPTOR	
BELMONT CO.	140	COMPLETED	5,040,246	819,413	2/62	STP & INTERCEPTOR	
			SUBTOTAL	1,394,180			

Table 2
Summary of Federal Water Pollution Control Act, Section 7 Grants
for Water Pollution Control Programs
(Ohio, West Virginia, and ORSANCO)

	<u>Federal Allot.</u>	<u>State Contribution</u>	<u>Total Budget</u>
<u>ORSANCO</u>			
FY 1968	\$ 159,500	\$ 172,500	\$ 332,000
FY 1969	\$ 167,000	\$ 192,300	\$ 359,300
FY 1970	\$ 175,700	\$ 200,000	\$ 375,700
FY 1971	\$ 175,700	\$ 200,600	\$ 376,300
FY 1972	\$ 176,600	\$ 198,400	\$ 375,000
	<u>\$ 854,500</u>	<u>\$ 963,800</u>	<u>\$1,818,300</u>

Level of Federal Participation = 47% of Total Budget

Ohio

FY 1968	\$ 427,500	\$ 450,000	\$ 877,500
FY 1969	\$ 439,300	\$ 511,900	\$ 951,200
FY 1970	\$ 445,000	\$ 613,700	\$1,058,700
FY 1971	\$ 453,400	\$ 876,000	\$1,329,400
FY 1972	\$ 447,800	\$1,085,000	\$1,532,800
	<u>\$2,213,000</u>	<u>\$3,536,600</u>	<u>\$5,749,600</u>

Level of Federal Participation = 38% of Total Budget

West Virginia

FY 1968	\$ 107,500	\$ 153,300	\$ 260,800
FY 1969	\$ 109,000	\$ 221,000	\$ 330,000
FY 1970	\$ 111,700	\$ 233,900	\$ 345,600
FY 1971	\$ 111,600	\$ 281,200	\$ 392,800
FY 1972	\$ 107,600	\$ 638,200	\$ 638,200
	<u>\$ 547,400</u>	<u>\$1,527,600</u>	<u>\$2,075,000</u>

Level of Federal Participation = 26% of Total Budget

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These grants are made to States and interstate agencies to assist them in meeting the cost of establishing and maintaining adequate measures for the prevention and control of water pollution, including the training of personnel of public agencies.

The effort to convince people to construct these existing facilities has come from many sources, including the agencies represented by the conferees. Through cooperative efforts of people like the conferees, like local governments and private industry, the water quality of the Ohio River in the conference area has shown considerable improvement over the years.

However, it is the opinion of the EPA that this progress toward cleaner water is not adequate, that indiscriminate dumping of undesirable waste products occurs almost daily throughout the conference area, and that many waste sources have failed to install adequate treatment facilities by the dates agreed upon with the State and Federal Governments.

The water in the Ohio River is, therefore, unnecessarily polluted. The existence of this interstate pollution is documented in this report.

Now a few words regarding the abatement programs now in progress. The Federal Water Pollution Control

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Act, as amended, called for the adoption, by June 30, 1967, of (a) water quality criteria applicable to interstate waters or portions thereof, and (b) a plan for the implementation and enforcement of the water quality criteria.

The water quality criteria adopted by the States of Ohio and West Virginia for the Ohio River are generally satisfactory and were endorsed by the then existing Federal Water Pollution Control Agency. However, the implementation and enforcement plans adopted by these States have proven to be less than adequate. The undesirable and unnecessary pollution of the Ohio River within the conference area is a direct result of a lag in the implementation and enforcement of acceptable abatement measures.

In some cases, the remedial programs in progress, or already completed, evidently have serious deficiencies as evidenced by the continuing pollution documented by the Federal report.

The purpose of this conference is to:

1. Jointly assess the adequacy of the abatement measures already completed, in progress, or planned.
2. Provide opportunity for participation by both the appropriate agencies and the general public in this assessment.
3. Consider the development of a more complete

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plan and schedule of measures for the abatement of this interstate pollution of the Ohio River within the conference area.

Now I shall proceed to the basic points which are brought out in the report. For those who care to follow my statement, I shall indicate the page from which I am reading and shall also indicate when I am departing from the written text. Going first then to page 13:

Municipal Water Supply

Three communities in this reach use the Ohio River as a raw source for water supply. Toronto and Steubenville, Ohio and Wheeling, West Virginia use the Ohio to supply approximately 113,900 people with 13.94 million gallons per day. All other communities along the river in this reach rely on groundwater from infiltration galleries, Ranney wells, and drilled wells for raw water sources.

This report also points out in the subsequent pages the adverse effects of the pollution upon fishing and recreation.

With respect to the use of the river for industry, I read as follows on page 14:

Industrial Water Supply

The Ohio River from Toronto, Ohio to McMechen,

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West Virginia is used extensively by industries as a source of process and cooling water. Total water use is in excess of 2.8 billion gallons per day, of which approximately 90 percent is used as once-through cooling water for thermal electric power generation. Two major steel producers account for the majority of the remaining 10 percent, the bulk of which is used for cooling purposes.

Now let me turn to the question of criteria, and I am going to page 16:

General Water Quality Criteria

Each State's water quality standards included criteria designed to protect the water uses of the stream. Specific approved criteria by States are listed in Table 1. The following is the general criteria adopted by the respective States and approved by the Federal Government:

West Virginia

"Certain characteristics of sewage, industrial wastes or other wastes or factors which render waters directly or indirectly detrimental to the public health or unreasonably and adversely affect such waters for present reasonable uses, are objectionable in all the waters of the State. Therefore, the State Water Resources Board does hereby proclaim that the

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following general conditions are not allowed in any of the waters of the State.

"No sewage, industrial wastes or other wastes entering any of the waters of the State shall cause therein or materially contribute to any of the following conditions thereof, which shall be the minimum conditions allowable:

"1. Distinctly visible floatable or settleable solids, suspended solids, scum, foam or oily slicks of unreasonable kind or quality;

"2. Objectionable bottom deposits or sludge banks;

"3. Objectionable odors in the vicinity of the waters;

"4. Objectionable taste and/or odor in municipal water supplies;

"5. Concentration of materials poisonous to man, animal or fish life;

"6. Dissolved oxygen concentration to be less than 3.0 milligrams per liter at the point of maximum oxygen depletion;

"7. Objectionable color;

"8. Objectionable bacterial concentrations;

"9. Requiring an unreasonable degree of treatment for the production of potable water by modern

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water treatment processes as commonly employed."

Ohio

"Minimum conditions applicable to all waters at all places at all times:

"1. Free from substances attributable to municipal, industrial or other discharges that will settle to form putrescent or otherwise objectionable sludge deposits;

"2. Free from floating debris, oil, scum, and other floating materials attributable to municipal, industrial or other discharges in amounts sufficient to be unsightly or deleterious;

"3. Free from materials attributable to municipal, industrial, or other discharges producing color, odor, or other conditions in such degree as to create a nuisance;

"4. Free from substances attributable to municipal, industrial, or other discharges in concentrations or combinations which are toxic or harmful to human, animal, or aquatic life."

At the end of September 1971, the State of Ohio held a public hearing to amend their water quality standards. At the close of these hearings, it is expected that these standards will be submitted to the Administrator

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for approval in accordance with Federal regulations.

Implementation and Enforcement Plans

A discussion of specific implementation plans applicable to the various wastewater discharges in the conference area is not included in the report. Such a discussion is basic to the conferees' consideration of the adequacy of abatement measures planned or in progress in the conference area and is therefore included in this statement.

At the outset, I should note that five of the major industrial polluters -- namely, the Wheeling-Pittsburgh Steel Corporation plants at Steubenville, Ohio and Follansbee, West Virginia; the Koppers Company at Follansbee, West Virginia; Valley Camp Coal Company at Triadelphia, West Virginia; and Weirton Steel Division of the National Steel Corporation at Weirton, West Virginia -- are engaged in litigation instituted by the U. S. Department of Justice. It would be inappropriate for this conference to include within its recommendations specifics concerning said companies; hence, they will not be included in the conference agenda, although some description of their basic operations will be included in order to complete the description of the industrial waste potential in the conference area.

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It should be noted here that Table 4 might be interpreted as a charge of pollution against the various municipalities and companies listed therein. This would be unjustified. The table merely lists all known or potential sources of waste discharges and is not intended to list known polluters.

To avoid any misunderstanding, we have prepared a list (Table III, appended to this statement) of those companies which, to the best of our knowledge and belief, are either violating established water quality criteria or are in violation of established implementation schedules. Briefly, those municipalities and companies are as follows:

A. Municipalities not in compliance:

Two municipalities in West Virginia, Beechbottom and Wellsburg, have no waste treatment facilities and are in violation of approved implementation plans and schedules.

B. Industries not in compliance, but excluded from consideration by this conference in view of pending lawsuits are:

1. Wheeling-Pittsburgh Steel Corporation - Steubenville, Ohio plant.

2. Wheeling-Pittsburgh Steel Corporation - Follansbee, West Virginia.

TABLE III

Waste Source	Location	Compliance Status		Water Quality Standards				Abatement Schedule				Remarks
		ORSANCO	EPA	Water Quality Standards				Abatement Schedule				
				A	B	C	D	A	B	C	D	
Toronto Paperboard Co.	Toronto, OH			NOT LISTED				1/73	7/75		1/77	To Toronto Municipal System
Titanium Metals Corporation	Toronto, OH			NOT LISTED					6/72	12/72		
Weirton Steel Corporation	Steubenville, OH	C	N	NOT LISTED								Acid, Iron
Wheeling - Pittsburgh - blast furnace	Steubenville, OH	C	N	7/68			12/69					Civil proceedings
- acid iron		C	N	7/68			12/69					Civil proceedings
- iron scale		N	N	7/68			12/69				12/72	Civil proceedings
Wheeling - Pittsburgh - blast furnace	Mingo Junction, OH	N	N	7/68			12/69-3/72	8/72	10/72	3/74	8/71	
- iron scale		N	N	7/68			12/69				12/72	
Penn Central	Mingo Junction, OH	C	N	7/68			12/69					Oil
Ohio Power	Brilliant, OH	C	N	NOT LISTED								Heat
Tiddland Cardinal Plants	Warrenton, OH	NS	N	NOT LISTED								Coal Fines
Ohio Coal & Construction Co.	Yorkville, OH	C	N	7/68			12/69					Acid iron, oil, hexavalent Chromium
Wheeling-Pittsburgh	Martins Ferry, OH	C	?	7/68			12/69				7/71	New plant in operation 10/10/71
Wheeling-Pittsburgh	Weirton, WV	NS	N									Civil proceeding
Weirton Steel Company	Poilsansbee, WV	NS	N									Civil proceeding
Wheeling-Pittsburgh (coke plant)	Poilsansbee, WV	NS	N									Acid, iron, oil
Wheeling-Pittsburgh (strip plant)	Poilsansbee, WV	NS	N									

TABLE III (continued)

Waste Source	Location	Compliance Status		Water Quality Standards				Abatement Schedules				Remarks	
		ORSANCO	EPA	A B C D				A B C D					
				A	B	C	D	A	B	C	D		
Pollansbee Steel Co.	Pollansbee, WV	C					12/70						
Koppers Company	Pollansbee, WV	N	N				12/70			7/71	9/73		Civil proceeding
S. George Company	Wellsburg, WV	C	N				12/70						Solids
Banner-Fibreboard Co.	Wellsburg, WV	NS	N				12/68						Solids
Wheeling-Pittsburgh	Beech Bottom, WV	NS	N				12/70						Alkaline cleaners, oil
Wheeling-Pittsburgh	Barnwood, WV	NS	N				12/70						Solids
(Municipalities)													
Toronto	Ohio			1/73	7/75		1/77	1/73	7/75		1/77		Primary Treatment
Steubenville	"			"	"		"	"	"		"		"
Mingo Junction	"			"	"		"	"	"		"		"
Brilliant	"			"	"		"	"	"		"		"
Rayland	"			"	"		"	"	"		"		"
Tiltonsville	"			"	"		"	"	"		"		"
Yorkville	"			"	"		"	"	"		"		"
Belmont County S.D. #1)	"			"	"		"	"	"		"		"
Weirton	West Virginia			9/71	7/72	7/73	1/75				1/75		Primary Treatment
Pollansbee	"	C	C										Secondary Treatment
Wellsburg	"	N	N				1/71				1/71		Raw sewage discharge
Beech Bottom	"		N								1/71		no action
Wheeling	"		N	9/71	7/72	7/73	1/75				1/75		Primary Treatment
Barnwood	"		C										Secondary Treatment
McMechen	"			7/72	1/73	1/74	1/75				1/75		Primary Treatment

LEGEND: A: Preliminary Plans, B: Final Plans, C: Start Construction, D: Start Operation
 NS: No Schedule C: How Complying M: Not Complying

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3. Koppers Company - Follansbee, West Virginia.

4. Valley Camp Coal Company, Triadelphia,
West Virginia.

5. Weirton Steel Division, National Steel
Corporation - Weirton, West Virginia.

C. Industries not in compliance (i.e., in
violation of federally approved implementation plans or
criteria):

1. Wheeling-Pittsburgh Steel Corporation -
Mingo Junction, Ohio (Blast Furnace - Iron Scale)

2. Penn Central Railroad, Mingo Junction, Ohio.

3. Wheeling-Pittsburgh Steel Corporation,
Follansbee, West Virginia, coke plant.

4. S. George Company, Wellsburg, West Virginia.

5. Banner Fibreboard Company, Wellsburg, West
Virginia.

6. Wheeling-Pittsburgh Steel Corporation,
Beechbottom, West Virginia.

7. Wheeling-Pittsburgh Steel Corporation,
Benwood, West Virginia.

8. Wheeling-Pittsburgh Steel Corporation,
Yorkville, Ohio plant.

D. Industries ostensibly considered to be in
compliance pending further investigations:

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1. Standard Slag Company
2. Sinclair Oil Company
3. Advance Metal Lithographing, Inc.
4. Signode Corporation
5. Starvaggi Industries, Inc.
6. Eastern Ohio River Sand & Gravel Co.
7. Federal Paperboard Company, Inc.
8. Hartje Brothers
9. Allied Oil Company
10. Nickel Plate Railroad
11. West Virginia Pulp and Paper Company
12. Pillsbury Company
13. Mammoth Plastics, Incorporated
14. Ohio Ferro Alloys Corporation
15. Tri-State Asphalt Corporation
16. Valley Camp Coal Company No. 1 (loading facility)
17. Standard Oil Company
18. Esso Standard Oil Company
19. Sun Oil Company
20. American Oil Company
21. Warwood Tool Company
22. Wheeling Stamping Company
23. Centre Foundry and Machine Company

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24. Pure Oil Company
25. Quaker State Oil Company
26. Contractors Supply Corporation of West
Virginia
27. Standard Sand and Gravel Company
28. Delta Concrete Company
29. Hanna Coal Company - Division of Consolidation
Coal Company

Although many municipalities and companies are not yet in violation of the terminal dates set forth in established implementation schedules -- that is, dates for the completion of specified treatment facilities -- based on present information many companies cannot or will not, unless pushed, meet these dates.

It is of vital importance that interim dates be fixed, so that progress can be gauged. One of the essential purposes of this conference is to arrive at an agreement of what such interim dates should be.

This brings me to the substance of this report, which relates to the type and source of the pollutants being discharged into the Ohio River within the conference area. I now turn to page 21:

SOURCES OF WASTES

The conference area contains numerous sources of

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untreated or inadequately treated wastes which are harmful and hazardous. These sources are given here in their order of significance as they affect water uses.

The most important source of wastewater in the area causing pollution is the steel industry and its related industries. Iron and steel are produced at Steubenville and Mingo Junction, Ohio by the Wheeling-Pittsburgh Steel Corporation and at Weirton, West Virginia by the Weirton Steel Division of the National Steel Corporation. The flue gas washwater from these blast furnaces at these plants passes through clarifiers to remove solids. These clarifiers are frequently overloaded, however, and solids are discharged to the river where they form deposits on the stream bottom.

The steel is shaped and sometimes coated at other steel plants in the area. Weirton Steel Division of National Steel has shaping and coating operations at Weirton, West Virginia and Steubenville, Ohio. Wheeling-Pittsburgh Steel Corporation has shaping and coating plants at Steubenville, Mingo Junction, Yorkville, and Martins Ferry, Ohio and at Follansbee, Beechbottom, and Benwood, West Virginia. Most of these steel plants have at least some elementary form of wastewater treatment.

We are pleased to note that the Martins Ferry

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plant of Wheeling-Pittsburgh Steel Corporation announced over the weekend of October 10 the completion of a \$750,000 facility for treating their wastes. We compliment the Wheeling-Pittsburgh Steel Corporation for this accomplishment. We hope this facility will do much to reduce the wastes previously discharged at this point of the Ohio River which has been a source of complaints from many citizens living in this area.

We have not had an opportunity to check the efficiency of this facility, but I might note since Sunday when the facility went on line we have not received any complaints.

Oil is another significant waste found in steel mill discharger, especially from the shaping and coating plants. Rolling mills use lubricating oils in the large machinery as well as coating oils on the steels being formed. A portion of these oils find their way into the river.

Other wastes from steel mills are acid and alkaline materials from rinses, hexavalent chromium, cyanide, and iron.

The steel companies also produce coke for their furnaces. Coke is made by heating coal in the absence of air. The wastewaters from coke plants contain phenols,

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cyanides, ammonia, and organic chemicals. The coke plants at Weirton and Follansbee, West Virginia, owned by Weirton Steel and Wheeling-Pittsburgh Steel, treat their effluents to remove much of the pollutants.

The Koppers Company operates a coal tar plant at Follansbee, West Virginia. Coal tar is supplied from the nearby coke plants. Various solvents, tars, and chemicals are produced. Wastewater from the plant contains phenols, oils, solids and alkaline materials.

Raw and inadequately treated sewage discharged to the river and streams is also a major pollution problem in this reach of the Ohio. These wastes carry great numbers of intestinal bacteria from human excretions, and pathogenic organisms are present.

The municipal waste sources discharging to the Ohio River in the conference area are listed in Table 3.

Several municipalities do not provide complete sewage collection systems for all the homes in their area. Harmon Creek, at Weirton, West Virginia, for example, reflects the lack of a complete collection system in that area. The high bacteria concentrations found in Harmon Creek are an indication that many homes discharge raw sewage directly into the creek.

Coal mining activities are the third most

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important source of waste. Coal mining and related activities are carried out on tributaries to the Ohio River. Acid water drains from old, inactive mines carrying high concentrations of iron and sulfate. Active mines also discharge similarly polluted water.

Frequently, water from the coal preparation plants pollutes the receiving streams with black coal dust. Mine refuse piles are also a known source of highly polluted water.

The water pollution from coal mining activity is a unique source of industrial waste in that it continues long after the mining has ceased.

Acid waters carrying iron sulfates and other dissolved materials come from many sites of mining activity. The receiving streams become red and yellow, and the streambeds are caked with "yellowboy," a yellow precipitate of iron hydroxide usually containing calcium sulfate and aluminum hydroxide.

Mine refuse is washed to the streams where it accumulates in streambeds. Many of the tributaries to the Ohio River in this area are grossly polluted by waste from coal mining activities.

Other industries discharge polluted waters. Thermal electric generating plants discharge large volumes

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of heated water. American Electric Power operates the Cardinal plant and the Tidd plant at Brilliant, Ohio and the Beechbottom plant at Power, West Virginia. The Cardinal and Tidd plants, in combination, are a significant source of heated water.

The Federal Paper Company at Steubenville, Ohio and the S. George Paper Company at Wellsburg, West Virginia are among the paper-processing plants known to discharge high amounts of solids. The river below these plants has been visibly discolored by these discharges.

Sand and gravel companies frequently discharge excess concrete to the banks of the river. Large fan-like deposits of concrete extend into the river at these locations.

Oil terminals along the river have had few incidents of oil spills, but oil slicks have been observed in the area.

Other industries in the area have discharges which have not been investigated.

Table 4 is a listing of industrial dischargers to the Ohio River in the Wheeling area. Effluents from some of these industries were sampled during the field survey for this report.

Now let me make a short statement concerning

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the effects of pollution. I am on page 32:

BACTERIAL POLLUTION

Municipal sewage contains high numbers of bacteria, frequently including pathogenic bacteria, derived from human excreta. These pathogenic bacteria can cause gastrointestinal diseases such as typhoid fever, dysentery, and diarrhea. Infectious hepatitis, a virus disease, can also be caused by ingesting sewage-polluted water. Eye, ear, nose, throat, or skin infections may result from bodily contact with such water.

As the densities of pathogenic bacteria are reduced by sewage treatment or forces of natural purification, the hazards of contracting disease are proportionately reduced.

Sewage also contains readily detectable coliform bacteria which typically occur in excreta or feces and are always present in sewage-polluted water. Though generally harmless in themselves, coliform bacteria have been considered indicators of the presence of pathogenic bacteria.

The coliform group includes several types of bacteria which may come from sources other than excreta.

I will now read portions of pages 34 and 36.

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Coliform Bacteria

In the study of the Ohio River in July and August 1970, total coliform densities in this conference area exceeded West Virginia's standard of 1,000 per 100 ml 100 percent of the time (120 samples). Total coliform densities exceeded 5,000 per 100 ml 77.5 percent of the time and exceeded 10,000 per 100 ml 46.7 percent of the time.

Salmonella Bacteria

In addition, a pathogen study was made at two sampling points during this study. While coliform densities indicate the magnitude of fecal pollution which may contain disease-producing organisms, detection of pathogenic Salmonella bacteria in water is positive proof that these disease-producing bacteria are actually present.

Modified Moore swab samples were taken at the following locations:

Ohio River below Steubenville, Ohio

Sewage Treatment Plant - River Mile 67.9

Ohio River at Bellaire, Ohio - River Mile 94.0

Salmonella, an enteric pathogen, was isolated at both stations, showing the existence of a health hazard in the river water.

Phenols

Phenolic materials have plagued municipal water

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users of the Ohio River for years. Chlorination of finished water containing excessive phenols gives a medicinal taste and odor to the water. Experience has shown that phenolic concentrations in the Ohio River are at a maximum in the winter months when the biological degradation of the phenols is retarded by cold water temperatures.

For example, EPA pollution surveillance data obtained during the period 1966 to 1970 from the Ohio River at Wheeling had an average phenolic concentration of 0.002 mg/l for the period May through April. Maximum concentration recorded during this period was 0.078 mg/l, which occurred in January 1970.

ORSANCO records of the Wheeling water treatment plant intake for the year 1969 show an average phenolic concentration of 0.005 mg/l for the period May through November and an increase to 0.011 mg/l for the period December through April.

Over the past several winters, the Wheeling water treatment plant has experienced difficulty in removing the high phenolic content of raw Ohio River water which is the sole source of water supply. This high phenolic content has imparted a highly objectionable taste to the finished water, usually for 2 to 3 months.

During the months of January and February 1971,

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an unusually high amount of phenolics was found in the Ohio River at Wheeling. At the water plant intake, phenolic concentrations approached 0.2 mg/l on several days as compared to West Virginia's water quality standard of 0.001 mg/l.

Investigations by the Wheeling EPA office resulted in actions taken under the 1899 Refuse Act through the Wheeling U. S. Attorney's office. With these actions, it is believed that nearly all of the taste and odor problems at the Wheeling water intake will be abated with a decided improvement in the finished water supply expected in the very near future.

I am now going to page 37.

Oil Pollution

Oil Pollution is one of the most visible forms of pollution in the Ohio River in this area. Surface oil destroys the aesthetic value of the river and restricts its use for recreation. A large number of complaints lodged by citizens in this area to the Environmental Protection Agency concerns floating surface oils. Oils also coalesce with natural sediment and other suspended material to form bottom deposits that are toxic to bottom animals, thus restricting the use of the river for aquatic life.

I am now going to page 39.

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Coal Mine Drainage

Many of the tributary streams to the Ohio River are intensely polluted by coal mine drainage.

The pollutants from mine drainage impair the principal water uses for municipal, industrial, and agricultural water supplies, certain water-based recreations, and support and propagation of fish and other aquatic life. In addition, these pollutants cause corrosion of instream facilities and aesthetically damage and degrade the waterfront property values.

The report also dwells on such pollutants as cyanide, sludge deposits, and the effects of pollution on aquatic life.

CONCLUSIONS

1. The Ohio River from Toronto, Ohio to McMechen, West Virginia is degraded by waste discharges from Ohio and West Virginia, causing interstate pollution which endangers health and welfare of persons in both States. Such pollution is subject to abatement under the Federal Water Pollution Control Act, as amended.

2. The Ohio River in this area often contains excessive amounts of oil, phenols, cyanide, and other chemicals discharged by industries in the area. Oils and solids settle to the river bottom near the outfalls and

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form putrescent, objectionable sludge deposits. Phenols, cyanide, and other chemicals harm or kill fish and other aquatic life and taint the flavor of fish flesh; they also are a cause of much concern to municipal water supply operators.

3. Several industries in this area discharge wastes into the river which cause visible pollution in the area of the outfalls.

4. The Ohio River in this area often contains excessive densities of bacteria, including pathogenic varieties which originate from untreated or inadequately treated domestic sewage. As a result, the use of the river for any type of recreation is hazardous to human health.

5. Many tributaries to the Ohio River from Toronto to McMechen are polluted by mine drainage which impairs use of the streams for water supplies, water-based recreation, and fish propagation, and it aesthetically damages and degrades property values.

6. There are waste sources in the conference area in violation of federally approved implementation plans and schedules.

RECOMMENDATIONS

These recommendations are to be construed as

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a device for changing established water quality standards nor for the establishment of effluent standards. Guidelines are recommended, however, for use by municipalities, industries, and consulting engineers to design the necessary treatment facilities needed to abate the pollution in the Ohio River within the conference area in order to meet the water quality standards.

It should be noted that the recommendations encompass, for the most part, the effluent standards included in ORSANCO's Standards 1-70 and 2-70.

1. All wastewaters discharged to the Ohio River or its tributaries in the conference area from municipal and industrial sources, including active mining operations, meet the following criteria:

- a. the total net oil concentration shall be less than or equal to 10 mg/l and no irridescence shall be visible.
- b. the net concentration of suspended solids shall not exceed 30 mg/l.
- c. pH shall be between 6 and 9 standard units.
- d. the net acidity concentration shall not exceed the net alkalinity concentration.
- e. the total net iron concentration shall be 7 mg/l or less.

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- f. the discharge shall not contain amounts of the following substances which would cause the concentration in the receiving stream to exceed the acceptable level as specified in the most recent edition of the United States Public Health Service Drinking Water Standards:

Arsenic

Barium

Cadmium

Chromium, hexavalent

Copper

Lead

Phenols

Selenium

Silver

Zinc

- g. the discharge shall not contain harmful or toxic material which kills over half the test organisms in a 96-hour bioassay. Test organism to be used is the most sensitive macroorganism native to the Ohio River, such as bullhead minnows, bluegill.
- h. the net concentration of cyanide shall not exceed 0.2 mg/l.

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1. the net concentration of ammonia shall not exceed 2.5 mg/l of ammonia as nitrogen (N).
2. All municipal waste treatment plants in the conference area shall provide a minimum of secondary treatment and adequate disinfection of their waste effluents. Secondary treatment is defined as that which provides a minimum of 85 percent reduction of both suspended solids and oxygen-demanding material as measured by the 5-day biochemical oxygen demand (BOD₅) test. Adequate disinfection is defined as that which provides an effluent which will contain a concentration not greater than 200 per 100 ml of fecal coliform organisms as a geometric average value, nor greater than 400 per 100 ml of these organisms in more than 10 percent of the samples tested.
3. All industrial waste sources are to provide, as a minimum, the equivalent of secondary treatment.
4. All municipal and industrial waste sources, including active mining operations, in the conference area have treatment facilities installed and operating to meet the recommended criteria by December 31, 1974, except when completion is required earlier by the federally approved water quality standards or by court decision. Interim dates for all waste sources in the conference area be submitted by the respective conferees to the conference

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chairman within 3 months.

With regard to the December 1974 completion date for wastewater treatment facilities, we are not attempting to change established standards, but are merely pointing out the need for discussion by the conferees regarding amendments to the States' implementation plan.

In view of the bacterial pollution in the river, we feel that the 1977 completion date in the State of Ohio's plan, as approved by the Federal Government, could well be reconsidered at this time by the conferees.

5. Oil, phenols, and cyanides constitute a major waste problem in the conference area, and it is recommended that the conferees consider the establishment of time schedules for their treatment more stringent than the December 31, 1974 date mentioned above.

6. All concentrations of materials be determined according to the procedures outlined in the latest edition of Standard Methods.

MR. STEIN: Thank you, Mr. Cantor.

Are there any comments or questions?

MR. HORTON: I have a question, Mr. Chairman.

MR. STEIN: Yes.

MR. HORTON: I would like to get to the Salmonella thing, Mr. Cantor. I think this is a very important

Robert Cantor

finding, and I think we need some enlightenment on just how we can get at the problem.

I am curious, and I would like to ask, does EPA look for or has it found Salmonella in other rivers in the country? Do you know of any studies that have been made?

MR. CANTOR: I am not familiar with what studies have been going on in other parts of the country, but I do know that Salmonella was also found in the Ohio River from Pittsburgh to the state line area.

MR. STEIN: Perhaps I can help you, Mr. Horton. The answer is yes. We have looked for Salmonella in other rivers and found it.

MR. HORTON: And found it?

MR. STEIN: Yes, sir.

MR. HORTON: Okay. Well, I mean I'm not a bacteriologist, but in getting ready to come up here I just learned that there are some 1,327 different strains of Salmonella. Now, did you go that far in your study? Did you attempt to identify the strains?

MR. STEIN: In the other areas we did.

MR. HORTON: You did?

MR. STEIN: I am not talking about this one. I would like for Mr. Cantor to do this. We identified the strain. There were long and laborious tests often going

Robert Cantor

over a period of 6 months or more.

In every case where we found Salmonella, obviously, because of the complexity of the tests, these were very carefully selected places, and they were related to inadequate or untreated sewage discharge in the other areas in the country. I am not talking about this one. But we did isolate specific strains.

MR. HORTON: Well, how about in this particular area?

MR. STEIN: I don't know.

MR. CANTOR: We did identify some. I don't recall offhand the exact number. There were I would say at least a dozen that were identified. We did not test for all of them.

MR. FERGUSON: Mr. Chairman, this might be of some help here. Our laboratory chief, Larry Parker, is in the audience, and perhaps he could add something to this discussion.

MR. STEIN: That might be wise. I appreciate Mr. Horton's questions, but in anything as complicated as the Salmonella testing it might be advisable to get him up if he can come up and see if he can supply the information.

Larry Parker

STATEMENT OF

LARRY PARKER

CHIEF, LABORATORY SERVICES SECTION

WHEELING OFFICE

ENVIRONMENTAL PROTECTION AGENCY

WHEELING, WEST VIRGINIA

MR. PARKER: I am Larry Parker, Chief of the Laboratory Services Section of the Wheeling Office. For this particular question, the Salmonella was tested under guidance of microbiologists of the Environmental Protection Agency, and the typing of the type of Salmonella was done by the Communicable Disease Center in Atlanta, Georgia, the Government specialist in this field.

In the appendix the Salmonella that were isolated appear. I won't bother to read them as such, but they do appear here in the appendix of the report for the two locations on the Ohio River at Bellaire and also the one below Steubenville.

As most of you realize, Salmonella detection and typing is a very long and tedious situation, and it's one that is not easily done. Of course, for that reason it has already been explained that total coliform and fecal coliform are better parameters, because you can more quickly detect these, and so this was done routinely.

Larry Parker

But for this study the Salmonella was isolated, and they were detected by the Communicable Disease Center of Atlanta, Georgia.

MR. HORTON: Were you able to identify specifically the source from which they came?

MR. PARKER: The purpose of the study was not the source but the detection in the river. As far as where they came from, this was not carried out in any detail.

MR. HORTON: But I think that is the problem that concerns me or that concerns us as conferees. Are we sure that if we followed these recommendations, the degree of disinfection, for example, that you have asked for, that is going to correct the Salmonella situation?

MR. STEIN: Do you want to answer that?

MR. PARKER: I could only speak by personal reference and discussions with other people. But it is felt that if you have good disinfection you will also kill the pathogens.

MR. HORTON: I understand, but there are so many different sources of Salmonella. I mean I'm all for disinfection of sewage. It is in our own requirements, of course. But I'm not sure that that's going to correct the situation that is reported. This is what I'm trying to get at.

Larry Parker

MR. FERGUSON: Bob, I appreciate your concern on this. Everyone is concerned about the sources. But all I can say is that if all domestic waste sources-- If the plants are properly operated and you have full disinfection, you are going to take care of at least that source or possible source of Salmonella. No one denies the fact that there may be other sources. But our problem here is one of going after a program that will treat all possible sources the best way we can.

And to get too concerned about whether or not you can pin down exactly from what source these Salmonella came I believe is somewhat a waste of time.

MR. HORTON: Perhaps you are right, John. As I say, certainly we wholeheartedly support adequate disinfection, and, as I say, it is in our own requirements.

But I'm afraid that even after we do that -- and as the report shows, a good many of the sewage discharges are already being disinfected -- we are still going to find Salmonella in the river. If that is the case, then I think everybody should understand it.

MR. FERGUSON: This is certainly true, Bob. I agree with this. You probably will find them. But we can't get away from the fact of let's zero in on those plants that we know are putting out improperly treated domestic

Larry Parker

sewage for one reason or other. It might be in the operation of the plant. It might be in the fact that adequate disinfection is not being done.

So if you zero in on that type of a program, at least we're going to solve that possible source, and hopefully this will reduce any danger that might be present in Salmonella that we know are there because we found them.

MR. STEIN: Are there any other comments?

(No response.)

I wonder if I could just talk about this generally, because, Mr. Horton, I appreciate your view, and we do have this problem dealing with Salmonella in various parts of the country.

But Salmonella, as many of you know, is a pathogenic organism and can cause and does cause human disease. Where we find Salmonella below a waste outfall, particularly of municipal wastes, the question here that you raise is very pertinent -- whether there is a causal connection.

Not only is the test for Salmonella very long and arduous to perform, but it is even more difficult to relate that to a causal connection between the point source and this.

Now, the approach that has been taken -- and this is just for the consideration of the conferees -- is that

Larry Parker

where we find that there is not year-around disinfection and where we find that there is not secondary treatment, that you are trying to disinfect primary, we have found a remarkable relationship between those sources and the detection of Salmonella below. I think the approach is, where you find that, to provide secondary treatment plus year-around disinfection.

Now, if we can agree on that, I think we would also have to agree that once we do that we may not have eliminated the Salmonella. There is a chance we may. If we have not eliminated the Salmonella, I think then we have two choices. We have to either look at the operation of the plant very carefully or look to other sources of the Salmonella.

But it would seem, in view of the very, very difficult situation of pinpointing the causal relation between the discharge and the creation of the Salmonella, once we find a major waste source, municipal waste source, above the detectable area of Salmonella, the first step is to try to get secondary treatment plus year-around chlorination and then see if that can eliminate the problem as a first step.

By the way, I am not sure we have arrived at that point all the way up and down the Ohio River or in

Larry Parker

other rivers where we have found Salmonella.

If we can agree on that, I think we have to recognize that we are not going to be 100 percent sure that we are not going to find Salmonella in the river when we are through.

MR. HORTON: Thank you, Mr. Chairman. There is no problem in agreeing. Certainly the States signatory to ORSANCO adopted the requirement of secondary treatment everywhere with adequate disinfection, so there is no problem on that.

MR. STEIN: Yes.

MR. HORTON: But I hope that once this is done we will go back and see if we still have Salmonella there in the river.

MR. STEIN: As a matter of fact, I think we all have to find that out.

By the way, again I would like to say that the record has been pretty fair once we have had secondary treatment plus disinfection on the elimination of that. But I would thoroughly agree that once this has gone in we should go back and check it out again and be sure we have achieved the results or that we know what we are doing with Salmonella.

MR. HORTON: Good.

Larry Parker
Robert Cantor

MR. STEIN: Right.

MR. RILEY: I think further, even after we install secondary treatment and adequate disinfection at the point sources, we are still going to be faced with the age-old problems connected with inadequate sewers, combined sewer overflows, that sort of thing, that is going to continue to be a source until we get some sort of program going to solve those problems.

MR. STEIN: Mr. Richards.

MR. RICHARDS: I have a comment. It is in reference to the recommendations read by Mr. Cantor.

I think it is significant to point out -- and this departs from the text that you have here with reference to the concentrations of such things as suspended solids, oil, and total acidity, iron -- these are net figures as was mentioned by Bob here, and in the text it did not say whether they were gross or net.

FURTHER STATEMENT OF ROBERT CANTOR

MR. CANTOR: Right.

MR. RICHARDS: There has been quite a bit of interest in this particular point, Bob.

MR. CANTOR: They all are net.

MR. RICHARDS: Right.

MR. CANTOR: Right.

Robert Cantor

MR. STEIN: Are there any other comments or questions?

MR. HENRY: Mr. Chairman, I have a question just for clarification.

In your report that was issued, the green report, Table 1 on page 17, you have the standards that have been approved by the EPA for West Virginia and Ohio, and in these standards we have differing standards. I will mention you have threshold odor different. Toxic substances are different. Arsenic and barium are different. Dissolved oxygen is different.

How are we going to go about the enforcement of violations of these standards when we have what might be a violation under one State's criteria and not a violation under the other?

MR. CANTOR: Well, as far as we know, the Ohio River belongs to the State of West Virginia.

MR. HENRY: Thank you. That's what we thought too.

MR. CANTOR: Therefore, we feel --

MR. HENRY: Does that mean we will use our standards or our criteria or Ohio's?

MR. CANTOR: We feel perhaps there needs to be a get-together between the States to resolve this difference.

Robert Cantor

The State of Ohio has recently held hearings to amend their standards. I have not seen those for comparison purposes. Perhaps this is being straightened out.

MR. STEIN: I would like, if you permit me, to clarify one point, because we have this in many rivers, particularly in a river such as you see in the stretch of the Ohio on the map behind me, where the river flows between two States side by side.

Often the boundary line in one State is on the mean low water mark or on the high water mark in the high water State.

The statement is often made that one State owns the river, and this is probably true in certain kinds of jurisdictions. For example, I remember in the Potomac River -- and the boundary is still here -- Maryland has the same situation as West Virginia. When they used to have slot machines legally operating in Maryland, some places in Virginia had little piers going out into the river with a booth, and they had a sign over that saying, "Entering Maryland, the free State."

But for purposes of water pollution control -- and this is the point I want to make -- the State of Ohio has the use of that river. And even though the waters remain in West Virginia -- or in the Potomac in Maryland --

Robert Cantor

if they endanger the health or welfare of persons in your neighboring State, like Virginia or Ohio, they are subject to abatement under these procedures.

So I think we have to talk in terms of the effect on health or welfare rather than the jurisdiction on this, and I wanted to clarify that point.

I really do think in answer to your question the obvious answer is -- and we have noted this from the beginning of the standard -- that unless neighboring States have identical, and I mean identical, standards for contiguous waters, we are going to run into problems of this kind.

I think Bob Horton and ORSANCO can help very much with that kind of a problem.

MR. HORTON: Thank you, Mr. Chairman. I just wanted to add that that is why you have an interstate commission. Mr. Henry is a member of that commission and a very active member.

This is part of the statement I am going to make so I won't dwell on it now, but ORSANCO has just gone through the process of adopting effluent standards for the Ohio River, and under those standards I am sure, Ed, that those standards, when they are met, will insure meeting of your criteria as well as those of the State of Ohio.

Robert Cantor

MR. HENRY: Very good.

I had one other comment, Mr. Chairman, or a question I guess it is. On page 4 of Mr. Cantor's presentation he refers to discussion by the conferees regarding amendments to the States' implementation plan. We have met with members of EPA in the past on implementation plan schedules, and, as we all know, some of these have slipped.

We would be very receptive to changes in some of these implementation plans. It has been my understanding that the 180-day notice procedure is necessary to change one of these. Is this still the case?

MR. CANTOR: Changing the standard?

MR. HENRY: Any implementation plan schedule.

MR. CANTOR: I think this comes under section 10(c) of the Act rather than in a conference proceeding such as this.

MR. HENRY: The answer to the question then is it does require the 180-day notice or does not?

MR. CANTOR: Not the 180-day notice.

MR. RILEY: No. The procedure for revision or modification or addition, adoption of new standards is spelled out by Federal regulation, and I can get that. I don't know the code number on that right now, but I can

Robert Cantor

get that for you.

MR. HENRY: That is just a question.

MR. STEIN: One of the things the conference can do is spotlight this issue so the appropriate procedure can be followed and we can get at that problem.

There are many alternative ways of doing this, but the 180-day notice is not the only one. You may want to use one of the others.

I would suggest that the conference technique is one you might consider for surfacing problems like that and getting the modifications made if you think that is appropriate.

MR. HENRY: That is all I have, sir.

MR. STEIN: Are there any other comments or questions?

(No response.)

I would like to have one for clarification because you did name two communities in West Virginia, municipalities, that were not in compliance. I don't want to single out any necessarily, but there were no municipalities in Ohio named, even though you found some Salmonella below some. Is that because there are different implementation dates?

MR. CANTOR: Not only that, but all of the municipalities in the State of Ohio within this conference

Robert Cantor

area do have at least primary treatment. And according to the implementation plan of the State of Ohio as approved by the Federal Government, they do not require additional treatment facilities until 1977.

MR. STEIN: Right, and again I don't want to belabor the point but just want to make it, but below one of the major cities in the area you found Salmonella and that city was not cited. They have primary treatment plus disinfection.

The point is they are not requiring secondary treatment until 1977. Yet if a similar community were in West Virginia, they would have had to have secondary treatment by 1974. Is that correct?

MR. CANTOR: According to the implementation plan, on or about 1975. This is true.

MR. STEIN: 1975?

MR. CANTOR: This is where perhaps we need some discussion between the conferees.

MR. STEIN: All right. I wanted to make that point because I think it is a difference in dates that may have led to the citing of some West Virginia communities and not the Ohio communities, rather than the difference in the necessity for providing secondary treatment and chlorination as soon as possible.

Robert Cantor

MR. CANTOR: These two communities in West Virginia do not have any treatment facilities whatsoever.

MR. STEIN: Right.

Are there any other comments or questions?

MR. RICHARDS: Mr. Stein, I will speak to this schedule problem in my presentation.

MR. STEIN: Right. Thank you very much, sir.

MR. HORTON: I will have a few more comments, but they are in my statement, and I would like to reserve them until that time.

MR. STEIN: All right.

MR. FROST: Mr. Chairman, I have one question.

MR. STEIN: Yes.

MR. FROST: Just for clarification purposes, in the presentation on page 9 are listed a number of industries considered in compliance, and I presume these are with Federal standards. Right?

MR. CANTOR: Are you referring to the industries in item D?

MR. FROST: Yes. Right.

MR. CANTOR: As we state, we have not made investigations of these. We do not have any specific --

MR. FROST: I was just trying to relate those to the Table 4 in your report on page 26 in which a number

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of these same industries appear indicating industrial sources of waste.

So we would not assume then at this time that these are necessarily in compliance?

MR. CANTOR: Right. I think I brought that out in the statement, that all of the industries listed in Table 4 should not be construed to be violators.

MR. FROST: Not considered --

MR. CANTOR: Right.

MR. FROST: Just considered in compliance as of this time pending investigation? Right?

MR. CANTOR: Right.

MR. FROST: Okay.

MR. STEIN: Again let me point that out, because I think this is a significant thing -- and very significant. They may be considered in compliance even though they are putting out an industrial waste now because they haven't missed a date.

I think that is why this date business is so important to reconsider. If you have one industry that happens to miss a date, you would have them out of compliance. Another may be putting out that material but didn't miss a date yet, and they are in compliance.

I think this very well may be the basic problem

Robert Cantor

for the conferees to consider.

MR. FROST: This is why I brought it up, to just clarify the issue here.

MR. STEIN: Right.

MR. FROST: Thank you.

MR. RILEY: There is another item to be considered. Under item D there are a number of oil companies mentioned. A potential source of pollution, as we all realize, is that from oil spills, and this was an attempt to delineate just what companies are there and what the potential is. Maybe some action is necessary to prevent spills. A spill would be a violation.

MR. RICHARDS: I think you will find most of those oil companies, if not all of them, are bulk plants that do not have any normal discharge.

MR. RILEY: Right.

MR. CANTOR: Right.

MR. STEIN: Thank you very much, Mr. Cantor.

MR. RILEY: I would like to now call on George Cingle of the Corps of Engineers District in Pittsburgh.

George Cingle

STATEMENT OF

GEORGE CINGLE

ARMY CORPS OF ENGINEERS

PITTSBURGH ENGINEER DISTRICT

PITTSBURGH, PENNSYLVANIA

MR. CINGLE: Mr. Chairman, my name is George Cingle. I am with the Pittsburgh District of the Army Corps of Engineers. I am appearing here today on behalf of Colonel Edward C. West, the District Engineer of the Pittsburgh District.

Colonel West appeared in Pittsburgh at the EPA Monongahela River Enforcement Conference on 24 August 1971 and at the Ohio River Conference on 30 September which were concerned with the water quality and associated environmental problems of the Monongahela and upper Ohio Rivers.

We were greatly impressed with the thoroughness and quality of these conference technical committee reports and with the extremely able and sympathetic manner in which Murray Stein conducted those gatherings under rather difficult circumstances.

I am here today to make the same appeals Colonel West made earlier at these other conferences for EPA consideration and evaluation of our offer to participate in

George Cingle

the furtherance of your program as stated in the EPA report on interstate pollution of the Ohio River, Wheeling, West Virginia - Steubenville, Ohio area and the similar EPA reports submitted at the enforcement conferences in Pittsburgh.

I do this with the genuine feeling that the present broader Corps sense of responsibility and desire for participation in remedial environmental matters places us in a strategic position of wanting to help and having the capability to do so without any appreciable mobilizing time.

As a public service Agency now actively engaged in reestablishing its future planning, estimating, engineering, construction and funding capabilities, which are the strengths of our civil works organization, we are inquiring as to where, in what capacity, and how we fit into your enforcement endeavor.

Once again, we respectfully ask: Can we become a conferee?

While the recommendations in the EPA report do not itemize the manner in which pollution from sources in both West Virginia and Ohio are endangering the health or welfare of persons elsewhere, we are in accord with the report findings and consider this effort as a distinct

George Cingle

advancement toward achieving quality water in the area.

In cooperation with EPA, the Corps of Engineers is preparing wastewater management studies for 5 urban metropolitan areas at selected trouble spots around the country. These are rapidly being pursued. It may be that a similar regional wastewater management study is needed for this region in order to advance the schedule of enforcement.

Finally, we are involved in the Pittsburgh District and will be involved for some time in comprehensive studies of river basins. These studies will include appraisals of pollution problems, means for abatement, and, most importantly, a time framing for needed facilities. Since there is no implementation plan, either on the water quality standards or on the conference report, we again offer our help by calling for closer coordination between EPA and the State conferees of this conference, with the further recommendation that the Corps be an active member or, at the least, as a Federal Agency with the interest and capability to help accomplish the objectives of this conference in a meaningful and timely manner.

Thank you, Mr. Stein.

MR. STEIN: Thank you.

Are there any comments or questions?

George Cingle

MR. RILEY: I would like to say, as I am sure you are aware, our Wheeling office in particular works pretty much on a day-to-day basis with your people in various water quality studies.

MR. CINGLE: Right. Very much so.

MR. RILEY: From that viewpoint, we certainly appreciate whatever efforts you have provided there, and we will continue to work in that manner.

With regard to the Colonel's continual request to sit in these conferences as a conferee, I believe that the law specifically provides that the conferees shall be representatives of the State water pollution control agencies and that the Federal representative shall be with the Environmental Protection Agency.

That latter point I will have to check a little further on. I am looking for it now.

But we appreciate his desire, but I think we have got a law here which specifically states that the Federal representative shall be the representative of the Administrator.

MR. CINGLE: We feel, however, that there is a service that we can offer in this whole endeavor, and this I believe is what the Colonel is concerned with.

MR. RILEY: We appreciate that.

E. Henry

MR. STEIN: Are there any other comments or questions?

(No response.)

Do you have any other Federal presentation?

MR. RILEY: That completes the Federal presentation.

MR. STEIN: We will stand recessed for 10 minutes.

(Whereupon, a recess was taken.)

MR. STEIN: Let's reconvene.

We will now hear from West Virginia. Mr. Henry.

STATEMENT OF

EDGAR N. HENRY

CHIEF, DIVISION OF WATER RESOURCES

WEST VIRGINIA DEPARTMENT OF NATURAL RESOURCES

CHARLESTON, WEST VIRGINIA

MR. HENRY: Thank you, Mr. Chairman.

I believe it would be appropriate for me to go through our report, and I do apologize for not having this available at the moment. We will have it redone and available within 3 days. Is that satisfactory?

MR. STEIN: We will keep the record open and put that in the record without objection as if read.

MR. HENRY: I would like to review a little bit. I think there are people here from West Virginia and

E. Henry

possibly Ohio and maybe the Federal Government even that do not know exactly how we operate. I would like to go through the report very, very hastily and point out what we do and where our responsibilities and authorities lie and come up with our conclusions and recommendations.

The legal responsibility for water pollution control, of course, is vested in the Division of Water Resources, Department of Natural Resources, as provided by chapter 20, article 5A of the Code of West Virginia, as amended. The water pollution law has undergone several amendments, the last being as late as 1969.

West Virginia operates under a water pollution control permit system. This is for all discharges to waters of the State. And, of course, "waters of the State" includes any waters on or beneath the surface of the ground.

Municipal wastewater permits are issued upon satisfactory compliance with West Virginia State Health Department criteria for sewage plant design. There is a split authority there. Basically, the permit we issue is for operating and maintenance of a satisfactory operation.

Industrial permits are issued after review of permit application and assurance that all industrial wastes will be satisfactorily treated and will not violate the water quality standards established for the Ohio River or

violate the provisions of effluent standards established by the Ohio River Valley Sanitation Commission.

I would mention that the State of West Virginia did set water quality standards and did present them to the Secretary of the Interior at that time, and our standards have been completely and fully approved by the Administrator of the EPA as set forth in letter dated July 30, 1971.

The Division of Water Resources established in 1967 five field offices throughout the State of West Virginia, and it is the responsibility of the field offices to maintain general surveillance of water resources and pollution control facilities within various areas. Two field offices, one located in Parkersburg and one located in Charleston, provide surveillance for the main stem of the Ohio River.

In the past the Division has attempted to maintain monthly inspections of all discharges to the Ohio River. This includes both municipal and industrial facilities. And while the surveillance has been general in nature, we feel constant pressure of individual contact lends to effective abatement and control measures.

Basically, two types of enforcement action can be caused to occur on individual polluters. The first is the administrative provisions of chapter 20 and its

E. Henry

accompanying permit system with criminal provisions as well as injunctive provisions, and we can also proceed in the arrest and subsequent trial in JP courts in the State of West Virginia.

The State of West Virginia has established under the water quality standards a network, and we have several of these stations on the Ohio River, two being located to bracket the Ohio as it enters West Virginia and as it leaves West Virginia.

In the municipal program, as I mentioned, the two agencies have control here. And I would mention one thing. The Division of Water Resources is also the agency administering Public Law 660 which is through the EPA, and this is a grants program. A major constraint of the West Virginia State law has been detailed to the EPA in the past, and this constraint does not allow the State of West Virginia to supplement the 30 percent basic grant of the Federal Government.

In addition to this constraint, various Federal agencies operating in the State of West Virginia, each with its particular program, cause unnecessary delays in the moving of a municipal waste project.

There is currently legislation in Washington being considered that would increase this 30 percent grant

money.

We also have an industrial waste program similar to the municipal waste program that covers the permit system and also surveillance.

We have concluded basically from review of the EPA report that was issued -- this green report that I mentioned earlier. Our conclusions were written, part of them, based on this, and for this reason some of our conclusions may sound a little different because there was a new statement made by EPA this morning.

Our conclusions are as follows:

The body of our report, the State report, in discussing the activities and responsibilities and authorities of West Virginia's water pollution control agency, and the tables and charts attached to the body of the report, which cover water quality criteria and also implementation programs for all industries and municipalities in the stretch of river being considered here, point out three significant aspects of the water pollution control program of the State of West Virginia as it relates to this section.

First, the State of West Virginia has had in existence for several years a water pollution abatement program. Industrial and municipal wastewater treatment

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plants have been built and placed in operation under this program. As is true in most areas of the Nation, the program has accelerated in the more recent years, as is evidenced by the many significant amendments to the West Virginia Water Pollution Control Act in 1969, which I mentioned earlier, and the effluent standards adopted by ORSANCO and the eight member States.

Second, the State of West Virginia would be acting in bad faith if it failed to recognize that, in spite of a program of pollution abatement, there are still pollution problem areas in the stretch of the Ohio River under consideration.

Third, in recognition of the problems still existing as a result of stream pollution, the State has developed a program of pollution abatement that, when fully implemented, should bring about solutions of the pollution problems in the area in question.

The recommendations provided in the hearing document I mentioned earlier, the green document, supplied the State of West Virginia by EPA, recommends new effluent criteria for oil, settleable solids, net acidity concentration, total iron, and fecal coliform and reschedules municipal compliance by 1 day. The conference lacks the authority to carry out the recommendations set by EPA.

Further, they would be unenforceable in West Virginia courts unless they were adopted by the West Virginia Water Resources Board in accordance with the West Virginia Code as amended.

West Virginia does not question the technical information supplied to this conference by EPA regarding water quality. It is not clear, however, why this conference was convened, in view of the fact that EPA has been aware for some time of the problems in this stretch of the Ohio River and the 180-day notice method could have been pursued where applicable.

West Virginia's water pollution control agency has enjoyed a good working relationship with the various Federal Agencies such as EPA, Corps of Engineers, Agriculture Department, and many others. These agencies are in a position to assist the State in its water pollution abatement efforts, and a continuing cooperative approach is believed to be the most efficient and effective means of achieving our common goal of clean water.

Our recommendations are, and it is recommended that:

1. The conference recognize the State water pollution abatement programs and assist in the implementation of those programs.

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2. The conference recognize the effluent standards set by ORSANCO and assist in a program of compliance with those standards, and, further, that any changes or additions to those standards be developed according to normal State and interstate procedures used in adopting effluent standards.

3. That the conference support an increase in construction grant funds availability, commensurate with needs, to enable an accelerated program of municipal waste treatment plant construction in West Virginia and Ohio.

4. Finally, that the mine drainage pollution problems caused by abandoned mines be considered a national problem, as recommended for abandoned mines in the Monongahela River Basin, and as such qualify for Federal funds for correction of those problems.

That completes my statement, Mr. Chairman.

(The complete West Virginia report follows.)

RECEIVED
OCT 13 1971
UPPER OHIO BASIN OFFICE
WHEELING, W. VA.

OHIO RIVER CONFERENCE ON WATER QUALITY
STATE OF WEST VIRGINIA
WHEELING, WEST VIRGINIA
OCTOBER 13, 1971

I. INTRODUCTION:

The purpose of this report is to provide information on the current status of water quality and pollution abatement in the West Virginia portion of the Ohio River from Milepoint 96.0 at McMechen, West Virginia, to Milepoint 59.0 at Toronto, Ohio. Further, it is hoped that the report addresses the problem before this Conference.

II. DESCRIPTION OF THE OHIO RIVER BASIN:

This description is restricted to that part of the Ohio River, its borderlands, and minor tributaries in West Virginia. The river valley lies entirely within the Appalachian plateau physiographic province, but its terraced bottom lands are unlike the topography that generally characterizes the province. The most conspicuous features are the broad, level flood plains and steep terraces. The terraces furnish good sites for industrial and residential facilities and farms. The lower most terraces are inundated at times by flood waters particularly in the southern part of the river valley.

The Ohio River is formed by the confluence of the Allegheny and Monongahela Rivers at Pittsburgh, Pennsylvania, and flows southwesterly 981 miles to the Mississippi River. It forms 277 miles of the West Virginia boundary, the line being set at the original low water line on the Ohio side of the river. The West Virginia part of the Ohio River drains about 85 percent of the State.

An important part of the flow of the Ohio River in West Virginia is inflow from the upper regions of the Ohio River Basin in Pennsylvania, New York, and Ohio. The average inflow of the river

is 40,000 cfs. Huntington is the furthest downstream point at which the river is gauged in the State. During twenty-six years of record (1934-1960), the average discharge was 70,580 cfs. The maximum discharge at Huntington, 654,000 cfs, occurred January 28, 1937. Minimum daily discharges of 3,200 cfs has occurred at least five times during the years 1934, 1935, and 1937. The discharge equals or exceeds about 11,800 cfs for 90 percent of the time. The river is controlled by many navigation pools created by lock and dam structures and constitutes an enormous volume of water. These pools are available for water supply and provide some minimum flood storage.

Numerous streams draining relatively small areas flow down the valley slopes of the Ohio River and contribute directly to the flow of the river. The comparison of the flow of three of the more sizable ones, Wheeling Creek, Middle Island Creek, and Twelvepole Creek, show that they are relatively flashy. Their general flow characteristics are somewhat alike owing to similar terrain, basin size, and precipitation.

The groundwater resources of the basin can be attributed to the unconsolidated alluvial deposits of the Ohio River and its tributaries. These groundwaters offer the best municipal and industrial sources of water in the State. It has been estimated that the total usage exceeds 60 million gallons a day and is only a small portion of the available possible production. Under favorable hydrologic and geologic conditions, a hydrolic gradient is established between the river and the pumping site and river water infiltrates the aquifers and moves toward the pumping well. A radial collector wells field at Parkersburg yields 5.5 million gallons of water per day.

III. WEST VIRGINIA'S WATER POLLUTION CONTROL PROGRAM:

The legal responsibility for water pollution control is vested in the Division of Water Resources, Department of Natural Resources as provided by Chapter 20, Article 5A, Code of West Virginia as amended. The water pollution control law has undergone several amendments, the last being in 1969.

West Virginia operates under a water pollution permit system for all discharges to waters of the State. Municipal wastewater permits are issued upon satisfactory compliance with the West Virginia State Department of Health criteria for sewage plants' design. Basically, the Division of Water Resources' permit covers the operation and maintenance of a satisfactory operation.

Industrial permits are issued after review of permit applications and assurance that all industrial wastes will be satisfactorily treated and will not violate the water quality standards established for the Ohio River or violate the provisions of the effluent standards established by the Ohio River Valley Water Sanitation Commission.

Federal Water Pollution Authority: Pursuant to the federal Water Quality Act of 1965, the State was given the opportunity to adopt, after public hearing, water quality criteria applicable to interstate waters or portions thereof within the State. The criteria along with a plan of implementation and enforcement was submitted to the Secretary on June 30, 1967.

Federal law required among other things that standards of quality could be established to protect the public health and welfare, enhance the water quality of the receiving stream. The State authority establishing such standards must take into account the uses and value of the waters for public water supply, propagation

of fish and wildlife, recreation, agriculture, industry, and all other legitimate uses.

The State criteria along with the implementation and enforcement plan has received full approval by the Administrator of EPA in a letter dated July 30, 1971. It is our understanding that the federal government makes the provisions of the state act federally enforceable.

Other Agencies Involved in the Ohio River Basin: It should be recognized that there are other interested parties involved in the overall activity of water pollution abatement and water resources development in the Ohio River Basin. We make particular reference to the Southern Regional Environmental Conservation Council, which is developing a compact that would permit legal and binding agreements for states which should be considered in future undertakings; the Ohio River Basin Commission, a state-federal body that has specific assignments in planning and construction of projects within the Ohio Basin; the Ohio River Valley Water Sanitation Commission, a compact of state and federal control agencies directly involved in water pollution management; and the U. S. Army Corps of Engineers acting under planning authority and the Refuse Act.

Federal-state activity in these agencies has included planning for the Ohio River Basin and has led to the establishment of various timetables, standards, criteria, and planning for the Ohio River Basin.

Surveillance and Enforcement: In 1967, the Division of Water Resources established five field offices throughout the State of West Virginia. It is the responsibility of the field offices to maintain general surveillance of water resources and pollution

control facilities within various areas. Two field offices, one located in Parkersburg and the other in Charleston, provide surveillance for the mainstem of the Ohio River.

In the past, the Division has attempted to maintain monthly inspections of all dischargers to the Ohio River. This includes both municipal and industrial facilities. While the surveillance has been general in nature, it is believed that the constant pressure of individual contact lends to effective abatement and control measures. Basically, two types of enforcement action can be caused to occur on individual polluters. The first is the administrative provisions of Chapter 20 and its accompanying permit system with criminal action provided as remedy for violations with arrest and subsequent trial in Justice of the Peace court or the Circuit Court.

Water Quality Network: The State in 1968 strengthened its existing water quality network by adding an additional thirteen stations on the Ohio River and minor tributaries. The northern most station is O-274, with the southern most station being O.8 located at Huntington, West Virginia. It was realized that the monitoring stations would most likely not pinpoint source discharges; however, general water quality conditions could be measured for possible future needs. We are including for the purpose of this report stations O-274, O-249, and O-223 for which this Conference is concerned.

Water Quality Standards: Water quality standards were adopted by the West Virginia Water Resources Board applicable to the Ohio River and minor tributaries. In the establishment of these standards, the Board took into consideration the current and future uses

of the Ohio River. (See Appendix I) The Ohio River Valley Water Sanitation Commission established specific effluent criteria which became effective November 13, 1970, and which are applicable to the mainstem of the Ohio River. (See Appendix II)

Municipal Program: Two agencies of the State of West Virginia have primary responsibility in the area of domestic wastes. The West Virginia State Department of Health reviews all permit applications and, where appropriate, issues a certificate based on design criteria. The Division of Water Resources, upon receipt of the certificate and a copy of the plans, reviews the effluent quality and plan of operation and if concurring with the State Health Department, issues a water pollution control permit.

The Division of Water Resources is the agency administering the Public Law 660 funds and as such coordinates the grants program for the construction of municipal waste water treatment facilities.

A major constraint of the West Virginia state law has been detailed to EPA in the past. This constraint does not allow the State of West Virginia to supplement the 30 percent basic grant of the federal government. In addition to this constraint, various federal agencies operating in the State of West Virginia, each with its particular program, cause unnecessary delays in the moving of a municipal waste project.

Industrial Waste Program: This program can be divided into three portions for discussion.

1. Coal Preparation: Since much of West Virginia is involved in mining activities and the associated production of marketable coal, a specific group is organized in the Division of Water Resources to deal with this particular problem. The waste control requirements

vary from a simple lagoon containing impounded coal fines through complex thickening and solid removal. Also included within this section is the activity dealing with runoff from such activities as haulroads and gob piles.

2. A new provision of Chapter 20, Article 5A as amended in 1969, requires that a permit be secured to open, reopen, operate, or abandon any mine, quarry or preparation plant or disposal of any refuse or industrial wastes or other wastes from any mine, quarry, or preparation plant providing that the Department's permit be required only whenever the aforementioned activity causes, may cause, or might reasonably be expected to cause a discharge into or pollution of the waters of the State.

While the State has had limited jurisdiction of mine water discharges in the past, the language of the amended act clearly sets forth the State's intention in controlling mine water drainage. As a result of the amended act, a new section was created in the Division of Water Resources dealing with mine drainage and more particularly, acid mine drainage. While the size of the Division's staff is limited, completion of a complex permit application is now being required prior to issuance of permits at any of the aforementioned activities.

3. Industrial Wastes other than Coal: The Division has for many years had an ongoing program of industrial pollution abatement. While the provisions of Chapter 20 require that all industrial dischargers have a water pollution control permit, the Division with a limited staff has attempted to investigate and place on notice all known industrial wastewater discharges of the requirement. Recent changes in requirements of industrial discharges such as the mercury

episode and the more recent Ohio River Valley Water Sanitation Commission's effluent standards have caused a rescheduling of certain compliance dates.

IV. IMPLEMENTATION SCHEDULE:

The Federal Water Pollution Control Act of 1965 required that the State provide along with other information a time schedule for the implementing of discharges to the Ohio River and its tributaries. For the purpose of the Conference, a listing of both municipal and industrial dischargers operating in West Virginia is attached.

V. CONCLUSIONS:

The body of this report, in discussing the activities, responsibilities and authorities of West Virginia's water pollution control agency, and the tables and charts attached to the body of the report point out three significant aspects of the water pollution control program of the State of West Virginia as it relates to the section of the Ohio River being considered at this Conference. First, the State of West Virginia has had in existence, for several years, a water pollution abatement program. Industrial and municipal wastewater treatment plants have been built and placed in operation under this program. As is true in most areas of the nation, the program has accelerated in the more recent years as is evidenced by the many significant amendments to the West Virginia Water Pollution Control Act in 1969 and the effluent standards adopted by ORSANCO and the eight member states.

Second, the State of West Virginia would be acting in bad faith if it failed to recognize that, in spite of a program of pollution

abatement, there are still pollution problem areas in the stretch of the Ohio River under consideration.

Third, in recognition of the problems still existing as a result of stream pollution, the State has developed a program of pollution abatement that, when fully implemented, should bring about solutions of the pollution problems in the area in question.

The recommendations provided in the hearing document supplied the State of West Virginia by EPA recommends new effluent criteria for oil, settleable solids, net acidity concentration, total iron, and fecal coliform and reschedules municipal compliance by one day. The Conference lacks the authority to carry out the recommendations as set forth by EPA. Further, they would be unenforceable in West Virginia courts unless they were adopted by the West Virginia Water Resources Board in accordance with the West Virginia Code.

West Virginia does not question the technical information supplied this Conference by EPA regarding water quality. It is not clear, however, why this Conference was convened in view of the fact that EPA has been aware for some time of the problems in this stretch of the Ohio River and the 180-day notice method could have been pursued where applicable.

West Virginia's water pollution control agency has enjoyed a good working relationship with the various federal agencies such as EPA, Corps of Engineers, Agriculture Department, and many others. These agencies are in a position to assist the State in its water pollution abatement efforts, and a continuing cooperative approach is believed to be the most efficient and effective means of achieving our common goal of clean water.

VI. RECOMMENDATIONS:

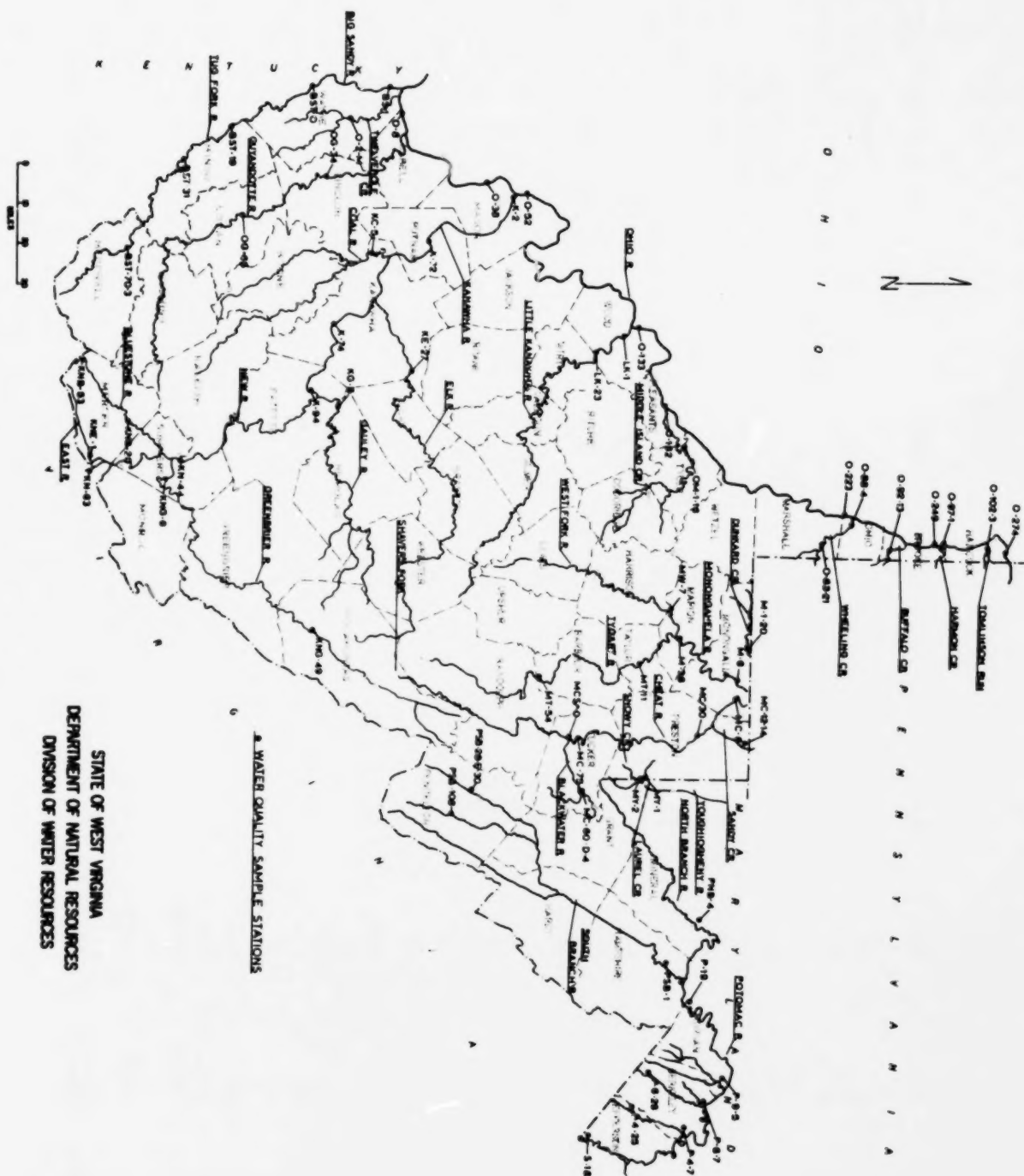
It is recommended that:

1. The Conference recognize the water pollution abatement program of the state and assist the state in implementing that program;

2. The Conference recognize the effluent standards adopted by ORSANCO and assist in obtaining compliance with those standards and, further, that any additions or changes to the standards be carried out by the normal state and interstate procedures for the adoption of such changes or additions;

3. The Conference support an increase in construction grant funds availability, commensurate with needs, to enable an accelerated program of municipal waste treatment plant construction in West Virginia and Ohio;

4. The mine drainage problems caused by abandoned mines be considered a national problem, as recommended for abandoned mines in the Monongahela River Basin, and as such qualify for federal funds for correction of those problems.



ANALYSES

	1-9-68	2-6-68	3-5-68	4-2-68	5-7-68	6-11-68	7-23-68	8-27-68
Time (Est)								
Flow (cfs)	1100	1055	1105	1105	0945	0925	1005	0940
Appearance								
Dissolved Oxygen	Frozen	Muddy	Green	Muddy	Green	Green	D Green	Green
B. O. D.	15.0	13.8	12.2	11.8	9.8	9.0	7.4	7.2
Acidity Mineral	2.4	0.9	1.8	1.1	2.3	2.5	4.9	2.2
Acidity Total								
Alkalinity Total	4	4	4	5	3	4	6	5
Chlorides	17	13	30	21	23	21	30	7
Chromium (Hexavalent) *Total	16	10	23	15	21	13	27	26
Coliform (MF/100 ml)	6100	3000	<100	12000	5600	1100	<0.005	<0.005
Fecal Coliform (MF/100 ml)							2500	28000
Fecal Strept. (MF/100 ml)								
Color (Units)	160	280	<10	210	<10	<10	<10	<10
Conductivity micro MHO	6	<5	<5	<5	<5	<5	<5	<5
Fluorides	300	187	411	244	306	320	470	600
Hardness	0.64	1.4	0.65	0.47	0.18	0.13	0.91	0.0
pH (Units)	106	70	142	92	138	112	144	212
Iron (Total)	6.9	6.8	7.0	6.9	6.9	7.0	7.0	6.5
Lead (Dissolved) (mg/l)	0.44	1.8	0.47	1.8	0.96	0.16	0.11	0.19
Manganese	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	0.045	0.018
Nitrates	0.60	0.33	0.71	0.38	0.82	0.44	0.17	1.3
Phenol (PPB)	2.3	2.8	1.9	2.7	2.3	2.7	3.5	2.3
Potassium	12.9	11.	2.9	0.0	3.7	1.7	0.43	0.0
Sodium	1.6	1.4	2.4	1.2	2.4	1.7	3.2	3.5
SOLIDS: Total	15	7.8	25	15	23	12	27	42
Suspended	213	160	279	192	289	209	304	438
Dissolved	20	37	10	39	10	13	20	4
Sulfates	193	123	269	153	279	196	284	434
Temperature Of	92	59	120	74	132	102	132	272
Threshold Odor No.	32.0	35.5	42.8	51.9	62.4	74.9	84.1	82.0
Turbidity (Units)	Qns	1.4	4	4	2	1.4	3	-
Arsenic	5	15	5	26	10	5	6	3
% Saturation of D. O.								
Copper	103	100	95	70	100	105	95	90
Mercury								
Silver (mg/l)	-	-	-	-	-	<0.02	<0.012	<0.005
Zinc (mg/l)	-	-	-	-	0.21	-	-	-
Cadmium (mg/l)	-	-	-	-	<0.01	<0.01	0.0005	0.002

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ANALYSES

	8-19-69	10-7-69	11-18-69	1-19-70	4-6-70	5-18-70	7-7-70	8-17-70
Time (Est) Flow (cfs)	1625	1300	1115	1420	1045	1115	1100	1040
Appearance	Green	Clear	-	-	-	-	-	-
Dissolved Oxygen	8.3	8.0	10.2	14.9	11.6	8.2	8.9	8.2
B. O. D.	1.5	4.0	2.0	3.4	2.0	4.0	8.8	3.8
Acidity Mineral								
Acidity Total								
Alkalinity Total	5	4	4	4	6	4	8	9
Chlorides	13	31	19	27	11	21	17	30
Chromium (Hexavalent) *Total	25	31	22	29	11	16	27	24
Coliform (MF/100 ml)	0.01	0.004	0.003	0.004	<0.001	0.004	0.001	0.001
Fecal Coliform (MF/100 ml)	36000	1000	6800	1400	3700	9100	100	300
Fecal Strept. (MF/100 ml)	-	-	-	<100	100	300	<100	<100
Color (Units)	10	<10	<10	130	260	10	<10	10
Conductivity micro MHO	<5	<5	<5	<5	<5	<5	<5	<5
Fluorides	500	420	450	340	200	360	470	500
Hardness	0.23	0.19	0.22	0.07	0ns	0.32	0.47	-
pH (Units)	162	154	148	74	44	126	154	156
Iron (Total)	6.6	7.4	6.8	7.1	6.6	7.1	6.5	6.8
Lead (Dissolved) (mg/l)	0.06	0.46	0.43	0.97	0.52	0.19	0.39	0.10
Manganese	<0.05	<0.05	<0.05	-	0.09	0.02	0.02	<0.02
Nitrates	0.59	0.60	1.2	0.61	0.52	0.27	0.83	0.10
Phenol (PPB)	3.1	6.0	3.3	3.5	4.1	2.3	2.4	4.7
Potassium	1	1	3	9	4	5	<1	3
Sodium	2.9	4.3	3.4	2.4	1.7	1.8	2.9	3.4
SOLIDS: Total	20	28	30	44	6.6	16	28	33
Suspended	314	331	329	221	229	268	326	333
Dissolved	23	9	15	15	90	41	2	4
Sulfates	291	322	314	206	139	227	324	329
Temperature of	67	147	151	86	75	118	150	148
Threshold Odor No.	81.8	70.0	52.0	33.0	44.0	66.0	79.0	80.0
Turbidity (Units)	1	1	1	1.4	2	1.4	1.4	1.4
Arsenic	10	12	7	10	125	45	12	11
% Saturation of D. O.								
Copper	104	89	92	-	-	-	-	-
Mercury								
Silver (ug/l)	<5	<5	<2	<1	<10	<4	<4	<4
Zinc (mg/l)	-	-	-	-	0.18	-	-	-
Cadmium (ug/l)	8	<2	2	<1	<1	<2	<2	<2

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ANALYSES

	<u>9-28-70</u>	<u>11-16-70</u>	<u>1-4-71</u>	<u>3-30-71</u>
Time (Est)	0900	1145	1150	1120
Flow (cfs)				
Appearance				
Dissolved Oxygen	8.0	11.4	14.1	11.5
B. O. D.	2.4	>8.5	>9.9	1.3
Acidity Mineral				
Acidity Total				
Alkalinity Total	4	6	7	2
Chlorides	32	25	13	16
Chromium (Hexavalent) *Total	19	15	19	19
Coliform (MF/100 ml)	0.005	0.010	0.005	0.003
Fecal Coliform (MF/100 ml)	16000	45000	400	800
Fecal Strept. (MF/100 ml)	400	1600	100	<100
Color (Units)	40	480	130	10
Conductivity micro MH0	<5	<5	8	<5
Fluorides	350	285	300	290
Hardness	0.26	0.13	0.14	0.14
pH (Units)	120	102	100	104
Iron (Total)	7.3	6.8	6.7	6.6
Lead (Dissolved) (mg/l)	0.29	1.2	1.1	2.0
Manganese	0.05	0.02	.074	.042
Nitrates	0.16	0.45	0.51	0.43
Phenol (PPB)	0.0	2.7	1.8	2.6
Potassium	<1	2	12	18
Sodium	2.9	2.3	1.8	1.4
SOLIDS: Total	21	18	16	23
Suspended	251	227	224	218
Dissolved	5	41	15	20
Sulfates	246	186	209	198
Temperature °F	97	83	95	79
Threshold Odor No.	71.0	51.0	38.0	-
Turbidity (Units)	2	1.4	1	2
Arsenic	12	48	30	37
% Saturation of D. O.	-	-	-	19
Copper (ug/l)	-	14	-	-
Mercury	<1	<0.4	<0.4	<0.2
Silver	<2	<4	<4	<2
Zinc	"	220	-	-
Cadmium	2	<2	<2	<2

SUMMARY OF WATER QUALITY DATA
January 1968 - March 1971
Station 0-274

27 Samplings

Dissolved Oxygen (at least 5.0 mg/l for 16 hours; never below 3.0 mg/l)

Maximum	15.0 mg/l
Minimum	6.8 mg/l

Number of Times
Criteria Violated - None

pH (5.5 to 9.0)

Maximum	7.4
Minimum	6.5

Number of Times
Criteria Violated - None

Temperature (not to exceed 93°F May to November; 73°F December to April)

Maximum	84.1
Minimum	32.0

Number of Times
Criteria Violated - None

Threshold Odor (not to exceed 24 at 60°C)

Maximum	4
Minimum	1

Number of Times
Criteria Violated - None

Coliform Bacteria (2400/100 ml for contact recreation on any day)

Maximum	68,000
Minimum	<100

Number of Times
Criteria Violated - 16

Arsenic (0.01 mg/l)

One sample .001 mg/l

SUMMARY OF WATER QUALITY DATA
January 1968 - March 1971
Station 0-274

(continued)

Barium (0.50 mg/l)

No samples run.

Cadmium (0.01 mg/l)

Maximum .008 mg/l
Minimum .001 mg/l

Number of Times
Criteria Violated - None

Chromium (0.05 mg/l) 21 samples

Maximum .014 mg/l
Minimum .001 mg/l

Number of Times
Criteria Violated - None

Lead (0.05 mg/l)

Maximum .0074 mg/l
Minimum .0001 mg/l

Number of Times
Criteria Violated - None

Silver (0.05 mg/l)

Maximum .012 mg/l
Minimum <.001 mg/l

Number of Times
Criteria Violated - None

Nitrates (45 mg/l)

Maximum 6.0 mg/l
Minimum 0.0 mg/l

Number of Times
Criteria Violated - None

SUMMARY OF WATER QUALITY DATA
January 1968 - March 1971
Station 0-274

(continued)

Phenol (.001 mg/l)

Maximum .015 mg/l
Minimum .001 mg/l

Number of Times
Criteria Violated - 17

Cyanide (.001 mg/l)

No samples run.

Fluoride (1.0 mg/l)

Maximum 1.4 mg/l
Minimum .01 mg/l

Number of Times
Criteria Violated - 2

Selenium (.01 mg/l)

No samples run.

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ANALYSES

	1-9-68	2-6-68	3-5-68	4-2-68	5-7-68	6-11-68	7-23-68
Time (EST)	1225	1135	1300	1220	1035	1030	1135
Flow (cfs)							Dark
Appearance	Frozen	Muddy	Green	Muddy	Green	Green	Green
Dissolved Oxygen	13.9	13.5	13.0	10.7	10.2	8.3	6.2
B. O. D.	8.7	1.5	1.1	1.4	3.8	1.4	1.6
Acidity Mineral							
Acidity Total	9	4	4	5	2	2	6
Alkalinity Total	25	15	23	18	21	10	24
Chlorides	21	16	23	21	27	13	26
Chromium (Hexavalent) * Total	-	-	-	-	-	-	<0.005
Coliform (MF/100 ml)	110000	2000	1900	6800	7300	200	83000
Fecal Coliform (MF/100 ml)	15000	240	10	90	30	<10	40
Fecal Strept. (MF/100 ml)	8	<5	7	<5	<5	<5	<5
Color (Units)	304	210	380	279	400	330	470
Conductivity micro MHO	0.88	1.0	0.72	0.62	0.23	0.51	0.5
Fluorides	120	30	134	102	146	114	158
Hardness	6.8	6.5	6.7	6.7	6.6	6.4	6.8
pH (Units)	1.55	8.6	0.54	4.1	3.6	2.3	1.4
Iron (Total)	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	0.10
Lead (Dissolved) (mg/l)	0.53	0.61	0.84	0.42	0.89	0.52	0.78
Manganese	2.3	3.6	1.6	2.7	2.7	3.4	3.5
Nitrates	117	2.2	18	2.9	4.2	2.7	1.9
Phenol (PPB)	2.2	1.4	2.3	1.4	2.5	1.6	3.1
Potassium	19	8.6	22	14	26	13	28
Sodium	270	209	289	246	304	224	315
SOLIDS: Total	28	47	29	71	12	19	13
Suspended	242	162	260	175	292	205	302
Dissolved	104	59	121	79	143	118	152
Sulfates	32.0	38.5	41.2	51.6	62.7	74.6	84.4
Temperature of	4	1	8	6	2	2	4
Threshold Odor No.	5	39	6	70	25	10	31
Turbidity (Units)							
Arsenic							
% Saturation of D. O.	95	102	102	96	105	97	80
Copper	-	-	-	-	-	-	-
Mercury	-	-	-	-	-	-	-
Silver (mg/l)	-	-	-	-	-	<0.02	<0.012
Zinc	-	-	-	-	-	<0.01	-
Cadmium	-	-	-	-	<0.01	<0.01	<0.0002

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ANALYSES

	8-27-68	10-1-68	11-19-68	1-7-69	2-25-69	4-8-69	5-20-69
Time (EST)	1105	1105	1220	1300	1110	1205	1215
Flow (cfs)							
Appearance	Green	Dark Green	Brown-Green	Brown	Green	Brown	Green
Dissolved Oxygen	7.0	8.0	9.7	13.9	12.1	11.4	9.0
B. O. D.	1.6	2.8	5.4	2.8	1.4	1.9	2.9
Acidity Mineral							
Acidity Total	5	5	5	3	19	8	6
Alkalinity Total	15	24	19	21	17	14	14
Chlorides	27	36	24	18	39	16	22
Chromium (Hexavalent) *Total	0.005	0.005	0.004	0.002	0.009	0.007	0.004
Coliform (MF/100 ml)	114000	73000	60000	75000	7000	5000	27000
Fecal Coliform (MF/100 ml)	-	-	1000	4300	400	200	300
Fecal Strept. (MF/100 ml)	30	<10	850	730	40	90	40
Color (Units)	<5	<5	<5	<5	<5	<5	<5
Conductivity micro MHO	690	560	430	255	370	218	310
Fluorides	0.1	0.38	0.25	0.35	1.07	0.2	1.02
Hardness	216	190	158	78	108	76	112
pH (Units)	6.5	7.0	6.9	7.3	6.8	6.8	6.8
Iron (Total)	0.42	0.24	1.1	2.05	5.0	2.4	3.5
Lead (Dissolved) (mg/l)	0.155	0.085	0.03	<0.02	0.06	0.05	0.05
Manganese	1.2	0.05	1.02	0.57	0.71	0.30	0.53
Nitrates	1.9	6.4	3.0	3.8	3.7	4.4	3.5
Phenol (PPB)	0.63	0.96	9.4	20	9	1	2
Potassium	3.7	4.6	3.3	1.9	2.3	1.4	1.7
Sodium	47	43	26	22	22	8.0	12
SOLIDS: Total	484	400	358	205	247	316	226
Suspended	27	14	64	53	19	171	18
Dissolved	457	386	294	152	228	145	208
Sulfates	294	201	150	62	96	62	85
Temperature of	82.6	53.9	51.5	35.9	45.7	53.1	68.2
Threshold Odor No.	-	4	4	2	1.4	1	1
Turbidity (Units)	8	30	25	58	78	155	35
Arsenic							
% Saturation of D. O.	88	74	87	101	101	105	98
Copper							
Mercury							
Silver (mg/l)	<0.005	<0.012	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	0.0015	0.001	<0.001	0.0005	0.025	<0.001	<0.0012
Cadmium							

ANALYSES

	7-29-69	8-19-69	10- 7-69	11-18-69	1-19-70	4- 6-70	5-18-70
Time (EST)	0855	1415	1015	0850	1650	1330	-
Flow (cfs)							
Appearance	Muddy	Brown- Green	Clear				
Dissolved Oxygen	7.1	7.6	8.5	11.3	14.3	11.5	9.2
B. O. D.	2.4	2.3	4.4	2.0	2.4	2.9	4.2
Acidity Mineral							
Acidity Total	5	4	5	4	3	5	5
Alkalinity Total	24	20	27	23	25	12	30
Chlorides	27	21	29	27	26	12	18
Chromium (Hexavalent) *Total	0.01	0.014	0.004	0.002	0.005	<0.001	0.011
Coliform (MF/100 ml)	9000	66000	22000	11000	<1000	3500	4500
Fecal Coliform (MF/100 ml)	-	-	-	-	100	200	500
Fecal Strept. (MF/100 ml)	50	350	<10	20	30	160	<10
Color (Units)	<5	<5	<5	<5	<5	<5	<5
Conductivity micro MHO	540	500	540	490	340	205	390
Fluorides	2.14	0.46	0.66	1.52	0.44	0.48	2.08
Hardness	164	148	162	154	88	22	144
pH (Units)	7.0	7.1	7.1	6.8	7.1	6.7	7.1
Iron (Total)	0.39	0.04	0.39	1.2	1.1	0.30	0.37
Lead (Dissolved) (mg/l)	<0.05	<0.05	<0.05	<0.05	-	0.03	0.07
Manganese	0.66	0.15	0.62	0.38	0.58	0.52	0.33
Nitrates	2.9	2.9	7.0	-	3.0	4.4	3.6
Phenol (PPB)	<1	3	2	4	9	2	1
Potassium	2.7	2.6	4.3	3.8	2.3	1.6	2.4
Sodium	28	27	25	39	20	6.7	20
SOLIDS: Total	365	304	343	328	212	269	281
Suspended	31	9	26	19	11	127	32
Dissolved	334	295	317	309	201	142	249
Sulfates	153	150	143	155	89	80	115
Temperature OF	80.0	82.4	70.0	51.8	35.0	43.0	69.0
Threshold Odor No.	1.4	1	1	1	2	2	2
Turbidity (Units)	30	29	12	12	12	155	42
Arsenic							
% Saturation of D. O.	87	96	95	102	-	-	-
Copper							
Mercury							
Silver (ug/l)	<5	<5	<5	<2	<1	<10	<4
Zinc (mg/l)	-	-	-	-	-	0.11	-
Cadmium (ug/l)	5.0	13	<2	8	<1	<1	<2

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ANALYSES

	<u>7-7-70</u>	<u>8-17-70</u>	<u>9-28-70</u>	<u>11-16-70</u>	<u>1-6-71</u>	<u>3-30-71</u>
Time (EST)						
Flow (cfs)	1435	1330	1415	1405	1345	1305
Appearance						
Dissolved Oxygen	7.3	8.0	7.8	11.0	-	12.0
B. O. D.	5.7	2.7	3.0	4.6	3.4	2.0
Acidity Mineral						
Acidity Total	15	5	5	17	6	6
Alkalinity Total	8	28	32	28	21	19
Chlorides	26	23	19	16	22	23
Chromium (Hexavalent) *Total	<0.001	0.001	0.001	0.006	0.008	0.001
Coliform (MF/100 ml)	1100	4600	18000	36000	600	1700
Fecal Coliform (MF/100 ml)	300	200	1800	1600	<100	300
Fecal Strept. (MF/100 ml)	20	<10	10	100	510	30
Color (Units)	<5	<5	5	<5	<5	<5
Conductivity micro MHO	495	500	350	282	285	300
Fluorides	0.4	-	0.3	0.16	0.15	0.18
Hardness	354	160	122	116	94	106
pH (Units)	5.8	7.0	7.1	6.9	6.9	6.6
Iron (Total)	0.32	0.13	0.54	1.2	4.6	1.6
Lead (Dissolved) (mg/l)	0.09	<0.02	0.02	0.01	17	62
Manganese	0.82	0.08	0.14	0.4	0.49	0.52
Nitrates	4.0	4.5	4.1	3.1	4.4	3.1
Phenol (PPB)	1	<1	<1	2	5	<1
Potassium	3.5	3.3	2.8	2.3	1.7	1.9
Sodium	25	30	26	18	18	38
SOLIDS: Total	339	351	250	212	454	214
Suspended	19	3	5	30	266	14
Dissolved	320	348	241	182	188	200
Sulfates	158	135	100	76	94	80
Temperature of	79.0	83.0	72.0	43.0	-	-
Threshold Odor No.	1.4	2	2	1	1.4	4
Turbidity (Units)	30	13	15	44	225	31
Arsenic	-	-	-	-	-	<10
% Saturation of D. O.	-	-	-	-	-	-
Copper (ug/l)	-	-	-	-	-	-
Mercury	-	-	-	-	-	-
Silver	<4	<4	<1	<0.4	<0.4	<0.2
Zinc	-	-	<2	<4	<4	<2
Cadmium	<2	3	2	<2	2	<2

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SUMMARY OF WATER QUALITY DATA
January 1968 - March 1971
Station 0-249

27 Samplings

Dissolved Oxygen (at least 5.0 mg/l for 16 hours; never below 3.0 mg/l)

Maximum	14.3 mg/l
Minimum	6.2 mg/l

Number of Times
Criteria Violated - None

pH (5.5 to 9.0)

Maximum	7.3
Minimum	5.8

Number of Times
Criteria Violated - None

Temperature (not to exceed 93°F May to November; 73°F December to April)

Maximum	84.4
Minimum	32.0

Number of Times
Criteria Violated - None

Threshold Odor (not to exceed 24 at 60°C)

Maximum	8
Minimum	1

Number of Times
Criteria Violated - 1

Coliform Bacteria (2400/100 ml for contact recreation on any day)

Maximum	114,000
Minimum	200

Number of Times
Criteria Violated - 19

Arsenic (0.01 mg/l)

No analysis.

SUMMARY OF WATER QUALITY DATA
January 1968 - March 1971
Station 0-249

(continued)

Barium (0.50 mg/l)

No samples run.

Cadmium (0.01 mg/l)

Maximum .025 mg/l
Minimum .001 mg/l

Number of Times
Criteria Violated - None

Chromium (0.05 mg/l) 21 samples

Maximum .009 mg/l
Minimum <.001 mg/l

Number of Times
Criteria Violated - None

Lead (0.05 mg/l)

Maximum .10 mg/l
Minimum .01 mg/l

Number of Times
Criteria Violated - 5

Silver (0.05 mg/l)

Maximum .012 mg/l
Minimum .001 mg/l

Number of Times
Criteria Violated - None

Nitrates (45 mg/l)

Maximum 7.0 mg/l
Minimum 1.6 mg/l

Number of Times
Criteria Violated - None

SUMMARY OF WATER QUALITY DATA
January 1968 - March 1971
Station 0-249

(continued)

Phenol (.001 mg/l)

Maximum .117 mg/l
Minimum <.001 mg/l

Number of Times
Criteria Violated - 17

Cyanide (.001 mg/l)

No samples run.

Fluoride (1.0 mg/l)

Maximum 2.14 mg/l
Minimum 0.1 mg/l

Number of Times
Criteria Violated - 5

Selenium (.01 mg/l)

No samples run.

210-223

ANALYSES

	1-9-68	2-6-68	3-5-68	4-2-68	5-7-68	6-11-68	7-23-68
Time (EST)	1435	1405	1430	1400	1250	1210	1340
Flow (cfs)							Dark Green
Appearance	Frozen	Muddy	Green	Muddy	Green	Green	Green
Dissolved Oxygen	14.2	12.8	12.3	10.6	10.5	8.2	5.5
B. O. D.	1.4	1.1	3.7	1.1	3.6	2.4	4.3
Acidity Mineral							
Acidity Total	4	2	4	3	5	5	5
Alkalinity Total	19	22	26	31	30	23	32
Chlorides	18	13	27	15	24	13	25
Chromium (Hexavalent) *Total	-	-	-	-	-	-	0.018
Coliform (MF/100 ml)	2300	6900	11300	6000	3500	4600	66000
Fecal Coliform (MF/100 ml)							
Fecal Strept. (MF/100 ml)	270	400	20	50	50	210	130
Color (Units)	<5	5	<5	<5	<5	<5	<5
Conductivity micro MHO	302	205	418	250	420	340	490
Fluorides	0.56	1.6	0.70	0.31	0.32	0.16	0.57
Hardness	108	80	146	98	152	132	166
pH (Units)	7.1	6.9	6.8	7.3	7.0	6.9	7.1
Iron (Total)	1.46	3.5	1.8	4.0	0.88	0.58	3.5
Lead (Dissolved) (mg/l)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.10
Manganese	0.52	0.47	0.73	0.49	0.82	0.46	0.49
Nitrates	2.8	3.8	2.1	3.0	2.7	2.6	4.5
Phenol (PPB)	47	38	18	9.2	3.4	0.67	2.1
Potassium	1.7	1.5	2.9	1.3	2.4	1.5	3.0
Sodium	16	8.3	25	10	25	11	28
SOLIDS: Total	238	188	296	347	308	248	453
Suspended	17	31	10	187	16	15	135
Dissolved	221	157	286	160	292	233	318
Sulfates	103	55	129	80	142	109	160
Temperature of	32.0	38.2	43.0	52.0	64.9	73.7	86.6
Threshold Odor No.	1	2	6	3	4	2	4
Turbidity (Units)	5	27	7	56	9	10	155
Arsenic							
% Saturation of D. O.	97	96	99	96	111	95	73
Copper							
Mercury							
Silver (mg/l)	-	-	-	-	-	<0.02	<0.012
Zinc	-	-	-	-	0.13	-	-
Cadmium	-	-	-	-	<0.01	<0.01	0.0005

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210-223

ANALYSES

	8-27-68	10-1-68	11-19-68	1-7-69	2-25-69	4-8-69	5-20-69
Time (EST)	1325	1320	1340	1445	1325	1405	1400
Flow (cfs)							
Appearance	Green	Dark Green	Brown-Green	Brown	Green	Brown	Green
Dissolved Oxygen	8.1	12.3	10.9	13.0	13.4	10.7	9.8
B. O. D.	5.7	10.3	3.1	6.3	1.9	2.8	3.5
Acidity Mineral							
Acidity Total							
Alkalinity Total	7	5	7	4	5	6	4
Chlorides	13	28	23	25	29	24	25
Chromium (Hexavalent) *Total	28	35	24	19	25	13	16
Coliform (MF/100 ml)	<0.005	0.006	0.005	0.002	0.004	0.007	0.003
Fecal Coliform (MF/100 ml)	130000	280000	1300	44000	13000	34000	11000
Fecal Strept. (MF/100 ml)	-	-	200	4100	2400	1700	200
Color (Units)	190	20	180	1360	460	1600	<10
Conductivity micro MHO	<5	<5	<5	<5	<5	<5	<5
Fluorides	620	540	460	250	360	213	320
Hardness	0.25	0.34	>1.0	0.34	1.14	0.18	0.46
pH (Units)	224	178	170	94	118	84	112
Iron (Total)	6.8	7.1	7.1	7.3	7.1	7.1	7.3
Lead (Dissolved) (mg/l)	0.20	0.26	0.80	4.2	1.1	0.95	0.54
Manganese	<0.012	0.015	<0.012	<0.02	<0.02	<0.05	<0.05
Nitrates	0.84	0.47	0.95	0.78	0.57	0.13	0.42
Phenol (PPB)	2.6	5.5	2.4	8.3	3.9	3.1	2.5
Potassium	0.0	0.0	3.7	8	14	<1	<1
Sodium	3.2	3.8	3.0	1.8	1.8	1.3	1.7
SOLIDS: Total	47	40	29	34	26	8.3	17
Suspended	485	370	352	761	234	611	244
Dissolved	17	8	16	604	15	451	19
Sulfates	468	362	336	157	219	160	225
Temperature of	300	173	160	92	92	59	90
Threshold Odor No.	83.9	65.6	52.6	38.9	45.0	52.8	69.8
Turbidity (Units)	-	2	2	2	1.4	1	2
Arsenic	6	7	26	470	13	290	10
% Saturation of D. O.							
Copper	104	131	99	98	111	97	109
Mercury							
Silver (mg/l)							
Zinc	<0.005	<0.012	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium	<0.001	<0.001	<0.001	0.0015	<0.001	<0.001	<0.0012

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ANALYSES

	<u>7-28-69</u>	<u>8-19-69</u>	<u>10-6-69</u>	<u>11-17-69</u>	<u>1-19-70</u>	<u>4-6-70</u>	<u>5-18-70</u>
Time (EST)	1745	1820	1630	1610	1925	1740	1720
Flow (cfs)							
Appearance	Muddy	Green	Clear				
Dissolved Oxygen	7.1	7.6	8.5	10.7	14.2	8.3	9.0
B. O. D.	4.0	2.6	3.6	3.3	1.9	qns	4.8
Acidity Mineral							
Acidity Total							
Alkalinity Total	9	5	6	2	3	4	5
Chlorides	29	22	29	19	27	13	31
Chromium (Hexavalent) *Total	27	27	33	28	28	13	23
Coliform (MF/100 ml)	0.009	0.01	<0.001	0.002	0.005	0.002	0.005
Fecal Coliform (MF/100 ml)	21000	22000	15000	2000	1900	3600	6300
Fecal Strept. (MF/100 ml)							
Color (Units)	360	100	<10	<10	30	200	400
Conductivity micro MHO	<5	<5	<5	<5	<5	360	40
Fluorides	600	520	560	490	370	216	<5
Hardness	1.03	0.52	0.74	2.02	0.46	0.48	410
pH (Units)	156	154	184	170	70	96	0.48
Iron (Total)	6.8	7.1	7.1	6.8	7.2	7.0	176
Lead (Dissolved) (mg/l)	0.43	0.03	0.35	1.9	1.2	0.42	7.3
Manganese	<0.05	<0.05	<0.05	<0.005	0.06	0.06	0.14
Nitrates	0.52	0.02	0.47	0.53	-	0.31	0.06
Phenol (PPB)	4.8	1.3	5.9	4.1	0.66	4.7	0.02
Potassium	1	2	1	2	3.7	3	4.9
Sodium	2.9	3.6	4.6	3.6	17	1.5	5
SOLIDS: Total	26	27	36	32	2.4	6.7	2.6
Suspended	469	309	355	337	245	312	21
Dissolved	144	13	9	13	16	161	296
Sulfates	325	296	346	324	229	151	34
Temperature of	146	144	168	160	101	80	262
Threshold Odor No.	82.5	82.3	73.0	52.5	-	43.0	123
Turbidity (Units)	1	1	2	1.4	2	1	69.0
Arsenic	130	11	10	13	12	155	1
% Saturation of D. O.	90	96	98	97	-	-	37
Copper							
Mercury							
Silver (ug/l)	<5	<5	<5	<2	<1	<10	<4
Zinc (mg/l)	-	-	-	-	-	0.21	-
Cadmium (ug/l)	1.2	<3	<2	<1	<1	<1	<2

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ANALYSES		7-7-70	8-17-70	10-19-70	11-16-70	1-6-71	3-30-71
Time (EST)		1815	1730	1145	1725	1730	1640
Flow (cfs)							
Appearance							
Dissolved Oxygen		9.9	6.8	9.2	10.7	FA*	11.6
B. O. D.		1.7	1.7	2.5	2.8	3.6	1.5
Acidity Mineral							
Acidity Total		48	13	11	7	5	8
Alkalinity Total		5	29	82	32	29	25
Chlorides		27	25	19	17	24	21
Chromium (Hexavalent) *Total		<0.001	<0.001	0.006	0.004	0.003	0.003
Coliform (MF/100 ml)		3400	7800	14000	9800	6400	1800
Fecal Coliform (MF/100 ml)		100	200	600	1400	1100	400
Fecal Strept. (MF/100 ml)		<10	10	20	80	600	20
Color (Units)		5	<5	<5	<5	<5	<5
Conductivity micro MHO		505	510	315	330	360	350
Fluorides		0.32	510	0.22	0.13	0.14	0.16
Hardness		172	160	2	134	130	134
pH (Units)		4.6	6.7	6.6	7.1	7.0	6.8
Iron (Total)		1.1	0.16	0.4	0.92	3.3	1.4
Lead (Dissolved) (mg/l)		0.30	<0.02	<0.02	0.02	16	28
Manganese		0.87	0.32	0.51	0.35	8.5	0.53
Nitrates		4.4	4.4	2.7	2.9	4.4	3.1
Phenol (PPB)		<1	3	<1	3	.9	<1
Potassium		2.9	3.4	2.7	2.3	1.9	1.6
Sodium		26	27	19	22	20	36
SOLIDS: Total		379	350	228	261	415	249
Suspended		35	7	10	43	184	12
Dissolved		344	343	218	218	231	237
Sulfates		186	120	88	95	117	100
Temperature Of		80.0	82.0	61.0	51.0	-	-
Threshold Odor No.		2	2	1	2	2	2
Turbidity (Units)		46	9	14	32	180	14
Arsenic		-	-	-	-	-	<10
% Saturation of D. O.		-	-	-	-	-	-
Copper (ug/l)		-	-	-	20	-	-
Mercury		-	-	<0.4	0.5	<0.4	<0.2
Silver		<4	<4	<4	<4	<4	<2
Zinc		-	-	-	34	-	-
Cadmium		7	2	<2	<2	<2	<2

* Field Accident

SUMMARY OF WATER QUALITY DATA
January 1968 - March 1971
Station 0-223

27 Samplings

Dissolved Oxygen (at least 5.0 mg/l for 16 hours; never below 3.0 mg/l)

Maximum	14.2 mg/l
Minimum	5.5 mg/l

Number of Times
Criteria Violated - None

pH (5.5 to 9.0)

Maximum	7.3
Minimum	4.6

Number of Times
Criteria Violated - 1

Temperature (not to exceed 93°F May to November; 73°F December to April)

Maximum	86.0
Minimum	32.0

Number of Times
Criteria Violated - None

Threshold Odor (not to exceed 24 at 60°C)

Maximum	6
Minimum	1

Number of Times
Criteria Violated - 1

Coliform Bacteria (2400/100 ml for contact recreation on any day)

Maximum	280,000
Minimum	1,300

Number of Times
Criteria Violated - 22

Arsenic (0.01 mg/l)

No analysis.

SUMMARY OF WATER QUALITY DATA
January 1968 - March 1971
Station 0-223

(continued)

Barium (0.50 mg/l)

No samples run.

Cadmium (0.01 mg/l)

Maximum .007 mg/l
Minimum .001 mg/l

Number of Times
Criteria Violated - None

Chromium (0.05 mg/l) 21 samples

Maximum .018 mg/l
Minimum .001 mg/l

Number of Times
Criteria Violated - None

Lead (0.05 mg/l)

Maximum .06 mg/l
Minimum .005 mg/l

Number of Times
Criteria Violated - 2

Silver (0.05 mg/l)

Maximum .012 mg/l
Minimum <.001 mg/l

Number of Times
Criteria Violated - None

Nitrates (45 mg/l)

Maximum 8.3 mg/l
Minimum 1.3 mg/l

Number of Times
Criteria Violated - None

SUMMARY OF WATER QUALITY DATA
January 1968 - March 1971
Station 0-223

(continued)

Phenol (.001 mg/l)

Maximum .047 mg/l
Minimum 0.0 mg/l

Number of Times
Criteria Violated - 19

Cyanide (.001 mg/l)

No samples run.

Fluoride (1.0 mg/l)

Maximum 2.02 mg/l
Minimum .13 mg/l

Number of Times
Criteria Violated - 4

Selenium (.01 mg/l)

No samples run.

OHIO RIVER MAINSTEM

October 4, 1971

STATUS OF SEWAGE TREATMENT FACILITIES

<u>Municipality</u>	<u>Mile Point</u>	<u>Present Type of Treatment</u>	<u>Implementation, Status and Comments</u>
Weirton	62	Primary	1975 Implementation date. Secondary expansion in preliminary planning stage. Town has responded to our deadline requirements. Application forms have been sent to Weirton for basic Public Law 660 construction funds. Copies of latest correspondence is attached.
Follansbee	70	Secondary	Completed 1965. Hooverton Heights is a satellite.
Wellsburg	74	None	Basic Grant Offer of \$487,440 accepted by town. 10 percent planning bonus amounting to \$14,080 allowed. Total grant of \$536,180 made to Wellsburg. On April 28, 1971 City Council rejected proposal for the purchase of \$1,410,000 worth of sewer revenue bonds. Governor's Office also offered \$190,000 supplementary grant to town. Construction bids were most favorable; however, town would not accept bids. (Copies of correspondence attached).
Beech Bottom	78	None	BHJ Planning Commission will not certify this project. Town is ready to apply for Public Law 660 funds and is not at fault.
Ohio County Public Service District (Short Creek Area)	82	None	Public Service District has grant. Is attempting to obtain HUD loan. No progress made for about three (3) years. Accepted \$410,700 Public Law 660 grant on June 22, 1967. Construction should have commenced by November 19, 1967. District has had difficulty in obtaining loan money from HUD. Mr. Snyder, Chairman, has made an honest effort to obtain assistance from both EDA and HUD. EDA may supplement grant up to 50 percent. BEL-O-MAR planning probably does not please HUD, therefore no HUD loan money will be offered. (Copies of correspondence attached).

OHIO RIVER MAINSTEM

October 4, 1971
page 2STATUS OF SEWAGE TREATMENT FACILITIES

<u>Municipality</u>	<u>Mile Point</u>	<u>Present Type of Treatment</u>	<u>Implementation, Status and Comments</u>
Wheeling (Warwood)	86-91	Primary	City plans to comply with January 1, 1975 implementation date. Application forms have been forwarded to City for Public Law 660 funds. Warwood is satellite and Triadelphia expects to become satellite in near future.
Benwood	94	Secondary	Three (3) secondary units.
McMechen	96	Primary	1975 implementation date. Town replied December 28, 1970 concerning our secondary expansion requirements. No further progress reports received.

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October 6, 1971

INDUSTRIAL WASTE DISCHARGES TO THE OHIO RIVER
MILE POINT 59.0 TO MILE POINT 96.0

<u>INDUSTRY</u>	<u>MILE POINT</u>	<u>CHARACTER OF WASTE</u>	<u>TREATMENT</u>
*Weirton Steel Div. of National Steel Corp.	62.0	Industrial	Removal of Solids & Oil
Status: Outfalls "C" and "E"; Permit No. 4237, issued May 15, 1970. Outfall "B"; Permit Application currently being processed with Basins in operation by July 1, 1972. Outfall "A"; Construction to begin upon completion of "B" with Basins in operation by July 1, 1973.			
Advance Metal Lith., Inc., Signode Corp.	65.7	Industrial	Oil skimming
Status: Permit No. 4237 issued August 16, 1971.			
*Wheeling-Pittsburgh Steel, East Steubenville Plant, Follansbee	68.8	Industrial	Primary
Status: Permit No. 3590, issued July 11, 1968. Company's proposed completion date of December 31, 1975 for a secondary treatment system has been rejected. They have been requested to move this date up to the end of 1973 at the latest. Letter sent September 16, 1971 requesting compliance schedule for ORSANCO Standards 1-70 and 2-70.			
*Koppers Co., Inc., Follansbee, WV	69.2	Industrial	Dephenolizer Columns
Status: Operating under a Temporary Permit, Permit No. 53, issued April 27, 1956. Permit Application currently being processed for an updated permit. Working on a phased implementation plan with secondary treatment facilities to be completed by September, 1973.			

Industries were sent letters of notification regarding ORSANCO Requirements on January 4, 1971.

INDUSTRIAL WASTE DISCHARGES TO THE OHIO RIVER

PAGE TWO

MILE POINT 59.0 TO MILE POINT 96.0

<u>INDUSTRY</u>	<u>MILE POINT</u>	<u>CHARACTER OF WASTE</u>	<u>TREATMENT</u>
*Wheeling-Pittsburgh Steel, Strip Plant, Follansbee, WV	70.3	Industrial	None
Status: Permit No. 3588, issued July 5, 1968. New facilities completed early 1971. Problem with iron and pH to be solved by March 31, 1972. Letter sent September 16, 1971 requesting compliance schedule for ORSANCO Standards 1-70 and 2-70.			
*Follansbee Steel Co., Follansbee, WV	70.6	Industrial	None
Status: Pickle liquor wastes are no longer being discharged to Ohio River or its tributaries.			
*Banner Fibreboard Co.	73.3	Industrial	Solids removal
Status: Operating under Permit No. 3224, issued May 6, 1966. Secondary treatment facilities to be completed by March 31, 1973.			
West Virginia Pulp and Paper	73.4	Industrial	Municipal System
*Pillsbury Company	73.5	Industrial	Municipal System

* Industries were sent letters of notification regarding ORSANCO Requirements on January 4, 1971.

INDUSTRIAL WASTE DISCHARGES TO THE OHIO RIVER
MILE POINT 59.0 TO MILE POINT 96.0
PAGE THREE

INDUSTRY

<u>MILE POINT</u>	<u>CHARACTER OF WASTE</u>	<u>TREATMENT</u>
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*S. George Company

74.1	Industrial-Sanitary	None
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Status: Unknown. Letter sent September 16, 1971 requesting compliance schedule for ORSANCO Standards 1-70 and 2-70. Company presently has no permit.

*Wheeling-Pittsburgh Steel, Beech Bottom Plant, Beech Bottom

79.2	Industrial	None
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Status: Permit No. 3587, issued July 8, 1968. Primary treatment facilities in operation by January 1, 1972. Letter sent September 16, 1971 requesting compliance schedule for ORSANCO Standards 1-70 and 2-70.

*Ohio Power Co., Beech Bottom Plant, Power, WV

79.8	Fly Ash, Heat	Fly Ash Basins
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Status: Permit Application currently being processed. Non-compliance with ORSANCO Standards 1-70 and 2-70 during low flow.

Warwood Tool Company

86.6	Industrial	Municipal System
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The Oil Company Terminals along the Ohio River have no effluents. If inspected and determined to be a potential pollution source, they are requested to obtain a permit.

MINE DRAINAGE ON OHIO RIVER

PAGE FOUR

MILE POINT 59.0 TO 96.0

<u>INDUSTRY</u>	<u>MILE POINT</u>	<u>CHARACTER OF WASTE</u>	<u>TREATMENT</u>
Valley Camp Coal Co., No. 1 - Short Creek Status: No treatment required.	82.2	Mine Drainage	None
Valley Camp Coal Co., No. 3 - Wheeling Creek - Triadelphia Status: Treatment adequate.	90.0	Acid Mine Drainage from Coal Refuse	Lime Neutralization and Mechanical Aeration.
Ohio Valley Div., Consolidation Coal Co., Shoemaker Mine Status: Treatment adequate.	93.6	Acid Mine Drainage	Lime Neutralization, Mechanical Aeration, and Sludge Settling Lagoons.

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October 6, 1971

INDUSTRIAL WASTES DISCHARGES TO THE OHIO RIVER
MILE POINT 59.0 TO MILE POINT 96.0

<u>INDUSTRY</u>	<u>MILE POINT</u>	<u>CHARACTER OF WASTES</u>	<u>TREATMENT</u>
Weirton Ice and Coal Supply Co.	62.0	Industrial - Coal	Settling Ponds
Status: Permit No. 3730 issued February 20, 1969 - Treatment Facilities adequate.			
Weirton Steel Co.	66.7	Industrial - Coal	Settling Ponds
Status: Permit No. 2040 issued May 15, 1962 - Treatment Facilities adequate.			
Hilltop Mining Co., Inc.	72.1	Industrial - Coal	Settling Ponds
Status: No Permit. Permit Application No. P-256 issued June 11, 1971 has not been submitted.			
Windsor Power House Coal Co.	78.0	Industrial - Coal	Settling Ponds
Status: Permit No. 81 issued November 12, 1958 - Treatment Facilities adequate.			
Valley Camp Coal Co. - No. 1, Short Creek	82.1	Industrial - Coal	Closed system with Emergency Ponds provided.
Status: Permit No. 3949 issued April 30, 1971 - Treatment Facilities satisfactory.			

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October 6, 1971

INDUSTRIAL WASTES DISCHARGES TO THE OHIO RIVER

MILE POINT 59.0 TO MILE POINT 96.0

<u>INDUSTRY</u>	<u>MILE POINT</u>	<u>CHARACTER OF WASTES</u>	<u>TREATMENT</u>
Valley Camp Coal Co. - No. 3, Triadelphia	90.0	Industrial - Coal	Effluent Impoundment
Status: Permit No. 3991 issued January 4, 1971 - Treatment Facilities satisfactory.			
Ohio Valley Division - Shoemaker Mine Consolidation Coal Co.	94.3	Industrial - Coal	Effluent Impoundment
Status: Permit No. 3716 issued January 16, 1969 - Treatment Facilities satisfactory.			



STATE OF WEST VIRGINIA
OFFICE OF THE GOVERNOR
CHARLESTON 25305

ARCH A. MOORE, JR.
GOVERNOR

August 17, 1971

Mr. William D. Ruckelshaus
Administrator
Environmental Protection Agency
Washington, D. C. 20460

Dear Mr. Ruckelshaus:

This is in regard to your letters requesting Enforcement Conferences on the Ohio River from Pittsburgh to Chester, West Virginia; the Ohio River from Toronto, Ohio to McMechen, West Virginia; and the Kanawha River in the Charleston area.

I do not believe such Enforcement Conferences will materially aid our pollution abatement program.

Pursuant to the Water Quality Act of 1965, this state held public hearings on water quality and established criteria on interstate and intrastate waters. As a part of the Act, the State was required to establish an implementation plan that would bring discharges into compliance. In general, industries discharging wastes were requested to establish treatment levels equivalent to that required of municipalities on the rivers in question.

All municipalities without treatment were required to establish secondary sewage treatment by 1975, or before in some cases. All municipalities with primary treatment were given until 1975 to accomplish secondary treatment.

The only exception to the above was acid drainage coming from abandoned coal mines.

Some slippage appears to be imminent in the case of municipalities, as the State is not yet in a position to provide matching funds in the construction grants program, although we

OFFICE OF THE GOVERNOR

Mr. William D. Ruckelshaus
Page Two
August 17, 1971

are attempting to proceed in spite of constitutional and budgetary restrictions. The confusing multiplicity of other Federal programs such as Farmers Home Administration, Economic Development Administration, and Housing and Urban Development, also has caused some delay in municipal funding. There were some delays in the industrial program; however, the State now has a firm detailed program of abatement with timetables and compliance dates.

In the case of the Ohio River main stem, the signatory States of the Ohio River Valley Water Sanitation Commission, which includes Ohio, Pennsylvania, and West Virginia, are currently developing additional programs relative to both industry and municipalities in compliance with the recent ORSANCO effluent standards. The Environmental Protection Agency has representation on the Commission and was a party in the development and adoption of said standards. Further, other remedies exist under the Federal Act - namely the 180 Day Notice and the 1899 Refuse Act of the Corps of Engineers to abate water pollution - and these should be followed in preference to an Enforcement Conference.

In regard to the Kanawha River, the Environmental Protection Agency has been brought into the picture from the very beginning and has participated in all discussion processes including the proposed Blue Ridge Power Project. In December, 1970, our agency invited the EPA to Charleston and presented Phase III of the Kanawha River Clean-up Program. I must point out that the Kanawha Program has received National attention in the manner in which it is being conducted, and we were not aware that its effectiveness was being questioned by your agency.

In 1963, an Enforcement Conference was convened on the Monongahela River. I am advised that a second meeting on this Conference has now been called for later this month. The lack of results in the eight years following that initial Enforcement Conference makes me skeptical as to the benefits that can be accomplished by pursuing such a course.

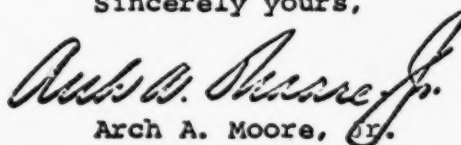
OFFICE OF THE GOVERNOR

Mr. William D. Ruckelshaus
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August 17, 1971

In the recent session of our State Legislature, I was able to provide a 90 percent increase in funding for the Water Resources Division of our Department of Natural Resources. I feel that our pollution abatement program is well planned and effective. The additional Water Resources personnel, made possible through increased funding, will improve our program to a greater extent than was ever possible in the past.

In view of the foregoing, I feel I must decline your invitation to join in the initiation of the Enforcement Conferences.

Sincerely yours,

A handwritten signature in cursive script, reading "Arch A. Moore, Jr.", is written over the typed name.

Arch A. Moore, Jr.
Governor

AAMJr:ms

Appendix I
ADMINISTRATIVE REGULATIONS
 of

THE STATE OF WEST VIRGINIA

for

WATER QUALITY CRITERIA

on

INTER AND INTRA STATE STREAMS

1970



DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER RESOURCES
CHARLESTON, WEST VIRGINIA

25305

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**WEST VIRGINIA ADMINISTRATIVE
REGULATIONS
STATE WATER RESOURCES BOARD**

**REQUIREMENTS GOVERNING THE DISCHARGE
OF SEWAGE, INDUSTRIAL WASTES AND
OTHER WASTES INTO THE WATERS
OF THE STATE**

Chapter 20, Articles 5 and 5A,
Code of West Virginia

John C. Ailes
Chairman
State Water Resources Board

Effective: August 18, 1970

**WEST VIRGINIA ADMINISTRATIVE 240
REGULATIONS
STATE WATER RESOURCES BOARD**

Chapter 20-5 and 20-5A
Series I
(1965)

**Subject: REQUIREMENTS GOVERNING THE
DISCHARGE OR DEPOSIT OF SEWAGE,
INDUSTRIAL WASTES AND OTHER
WASTES INTO THE WATERS OF THE
STATE.**

The State Water Resources Board and the Chief of the Division of Water Resources in the State Department of Natural Resources, under Chapter 20, Article 5A, Code of West Virginia, have the power and authority to determine whether any person, firm, municipality or corporation is polluting any of the waters of the State and to prevent, control, eliminate or reduce such pollution. In making such determination, due consideration shall be given, in accordance with the public policy of the State of West Virginia, to the use of available and reasonably practicable methods to control and reduce pollution. In so doing, recognition shall be given to the fact that each stream in the State may represent a separate problem and further, that the use of a watercourse for dilution of wastes is proper so long as the net results to not cause or contribute to conditions hereinafter not allowed.

Section 1. GENERAL

1.01 Scope — These regulations establish requirements governing the discharge or deposit of sewage, industrial wastes and other wastes into the waters of the State.

1.02 Authority — These regulations are issued under authority of West Virginia Code, (Section 3, Article 5A, Chapter 20).

1.03 Effective Date — These regulations are promulgated on April 27, 1970, and become effective thirty days after filing in the Secretary of State's Office.

1.04 Filing Date — These regulations were filed in the Office of the Secretary of State of July 20, 1970.

1.05 Certification — These regulations are certified authentic by the Chairman of the State Water Resources Board by certification number 3.

Section 2. DEFINITIONS

2.01 "Person", "waters", "pollution", "sewage", "industrial wastes", and "other wastes" shall have the same meanings as defined by the Code of West Virginia, Chapter 20, Article 5A, Section 2.

Section 3. GENERAL CONDITIONS NOT ALLOWABLE IN STATE WATERS

3.01 Certain characteristics of sewage, industrial wastes or other wastes or factors which render waters directly or indirectly detrimental to the public health or unreasonably and adversely affect such waters for present or future reasonable uses, are objectionable in all waters of the State. Therefore, the State Water Resources Board does hereby proclaim that the following general conditions are not to be allowed in any of the waters of the State.

No sewage, industrial wastes or other wastes entering any of the waters of the State shall cause therein or materially to contribute to any of the following conditions thereof, which shall be the minimum conditions allowable:

- (a) Distinctly visible floating or settleable solids, solids, scum, foam or oily slicks of unreasonable kind or quantity;
- (b) Objectionable deposits on bottom or sludge banks;
- (c) Objectionable odors in the vicinity of the waters;
- (d) Objectionable taste and/or odor in municipal water supplies;
- (e) Concentrations of materials poisonous to man, animal or fish life;
- (f) Dissolved oxygen concentration to be less than 3.0 parts per million at the point of maximum oxygen depletion;
- (g) Objectionable color;
- (h) Objectionable bacterial concentrations;
- (i) Requiring an unreasonable degree of treatment for the production of potable water by modern water treatment processes as commonly employed.

3.02 Waters whose existing quality is better than the established standards will not be lowered in quality unless and until it has been affirmatively demonstrated to the Chief of the Division of Water Resources, Department of Natural Resources, that such change is justifiable as a result of necessary development and will not interfere with or become injurious to any present or future assigned uses of such waters. In special cases where the facts warrant, more stringent standards or exceptions thereto may be established. In implementing the policy of this paragraph as it relates to interstate streams, the Secretary of The Interior will be kept advised and

provided with such information as he will need from time to time to protect the interests of the United States and the authority of the Secretary in maintaining high quality of interstate waters.

Section 4. REPORTING SPILLS AND ACCIDENTAL DISCHARGES

4.01 It is recognized that spills and accidental discharges of sewage, industrial wastes and other wastes are contrary to the language and intent of the State Water Pollution Control Law and these spills and accidental discharges are likely to occur from time to time, notwithstanding efforts to prevent them.

It is further recognized that such spills and discharges are likely to have such a deleterious effect upon the quality of the waters of the State as to cause serious damage or to impose unwarranted burdens upon the downstream water users.

For these reasons the State has had a voluntary spill alert system in operation since 1958 and the State Water Resources Board hereby declares it mandatory that, in order to minimize the adverse effect which the above-described occurrences may have upon users of water of the State, the following procedures shall be followed:

(a) Each and every municipality, corporation, person or other entity which or who may cause or be responsible for any spill or accidental discharge into the waters of the State, of sewage, industrial waste or other substance of such character and in such quantity as to be unsightly or deleterious to the quality of such waters shall give prompt notification thereof by telephone to the Chief of the Division of Water Resources, State Department of Natural Resources, or an employee thereof;

(b) Such notification shall set forth the time and place of such spill or discharge, the type or types and quantity or quantities of the material or materials therein, action or actions taken to stop such spill or discharge and to minimize the polluting effect thereof, the measure or measures taken or to be taken in order to prevent a recurrence of any such spill or discharge and such additional information as may be requested by the Division of Water Resources;

(c) It shall be the responsibility of each industrial establishment or other entity discharging directly to a stream to have available insofar as practicable and reasonable the following information pertaining to those substances that are employed or handled in its operation in sufficiently large amounts as to constitute a hazard in case of an accidental spill and discharge into a public stream:

- (1) Potential toxicity in water to man,

animals and aquatic life;

- (2) Details on analytical procedures for the quantitative estimation of such substances in water;
- (3) Suggestions on safeguards or other precautionary measures to nullify the toxic effects of a substance once it has gotten into a stream;
- (d) A written verification of such report shall be submitted upon request of the Division of Water Resources.

4.02 Parts 4.01 (a) and (b) shall also apply to spills to the waters of the State resulting from accidents to common carriers by highway, rail and water transporting chemicals or other substances which are likely to have a deleterious effect upon the receiving waters.

4.03 Failure to furnish such information as required by Section 9, Article 5A, Chapter 20, Code of West Virginia shall be punishable under Section 19, Article 5A, Chapter 20, Code of West Virginia.

Section 5. ACID MINE DRAINAGE CONTROL MEASURES

5.01 Certain acid mine drainage control measures were adopted by the Ohio River Valley Water Sanitation Commission and promulgated as Resolution No. 5-60, as amended January 10, 1963. The State of West Virginia is a member of the Ohio River Valley Water Sanitation Compact and as such has agreed to carry out the control measures so established. Waters of the State of West Virginia are being polluted by acid discharges from coal mining and related operations, hereinafter referred to as "acid mine drainage", contrary to the language and intent of the State Water Pollution Control Law.

5.02 It has been demonstrated that the conscientious application of certain principles and practices will, under certain conditions, alleviate the pollution from acid mine drainage. Therefore, in furtherance of the policy and procedures of the State Water Resources Board, the following measures are hereby adopted by the Water Resources Board for the control of acid mine drainage pollution in the State of West Virginia:

- (a) 1. Surface waters and ground waters shall be diverted where practicable to prevent the entry or reduce the flow of waters into and through workings.
- 2. Water that does gain entry to the workings shall be handled in a manner which will minimize the formation and discharge of acid mine drainage to streams.

- (b) Refuse from the mining and processing of coal shall be handled and disposed of in a manner which will minimize discharge of acid mine drainage therefrom to streams. Where acid-producing materials are encountered in the overburden in stripping operations, these materials shall be handled so as to prevent or minimize the production of acid mine drainage, taking into consideration the need for stream pollution prevention and all economic factors involved.
- (c) Discharge of acid mine drainage to streams shall be regulated insofar as practicable to equalize the flow of daily accumulations throughout a 24-hour period.
- (d) Upon discontinuance of operations of any mine all practicable mine-closing measures, consistent with safety requirements shall be employed to minimize the formation and discharge of acid mine drainage.
- (e) Under appropriate circumstances, consideration shall be given to the treatment of acid mine drainage by chemical or other means in order to mitigate its pollutorial properties.

**WEST VIRGINIA ADMINISTRATIVE
REGULATIONS
STATE WATER RESOURCES BOARD**

**REQUIREMENTS GOVERNING THE DISCHARGE
OF SEWAGE, INDUSTRIAL WASTES AND OTHER
WASTES INTO THE WATERS OF THE STATE
AND ESTABLISHING GENERAL WATER USE
CATEGORIES AND WATER QUALITY
STANDARDS FOR THE WATERS OF THE STATE**

Chapter 20, Articles 5 and 5A,
Code of West Virginia

John C. Ailes
Chairman
State Water Resources Board

**WEST VIRGINIA ADMINISTRATIVE 246
REGULATIONS
STATE WATER RESOURCES BOARD**

Chapter 20-5 & 20-5A

Series II
(1967)

Subject: REQUIREMENTS GOVERNING THE
DISCHARGE OR DEPOSIT OF SEWAGE,
INDUSTRIAL WASTES AND OTHER
WASTES INTO THE WATERS OF THE
STATE.

The State Water Resources Board and the Chief of the Division of Water Resources in the State Department of Natural Resources, under Chapter 20, Article 5A, Code of West Virginia, have the power and authority to determine whether any person, firm, municipality or corporation is polluting the waters of the State and to prevent, control, eliminate or reduce such pollution. In making such determination, due consideration shall be given, in accordance with the public policy of the State of West Virginia, to the use of available and reasonably practicable methods to control and reduce pollution. In so doing, recognition shall be given to the fact that each stream in the State may present a separate problem and further that the use of a watercourse for dilution of wastes is proper so long as the net results do not cause or contribute to conditions hereinafter not allowed.

Section 6. GENERAL AND WATER USE CATEGORIES

6.01 Scope. — These regulations establish requirements governing the discharge or deposit of sewage, industrial wastes and other wastes into the waters of the State and establish general water use categories and water quality standards for the waters of the State.

6.02 Authority. — These regulations are issued under authority of the West Virginia Code (Section 3, Article 5A, Chapter 20).

6.03 Effective Date. — These regulations are promulgated on April 27, 1970, and become effective thirty days after filing in the Secretary of State's Office.

6.04 Filing Date. — These regulations were filed in the Office of the Secretary of State on July 20, 1970.

6.05 Certification. — These regulations are certified authentic by the Chairman of the State Water Resources Board by certification number 3.

6.06 Category A. Water Contact Recreation:
This category includes swimming, fishing, water skiing, and certain types of pleasure boating such as sailing in very small craft and small outboard motor boats.

6.07 Category B1. Water Supply, Public:
This category is used to describe all waters used for public supplies. It does not include water for cooling.

6.08 Category B2. Water Supply, Industrial:
This category is used to describe all waters used for industrial supplies. It does not include water for cooling.

6.09 Category B3. Water Supply, Agricultural:
This category includes all water used for agriculture, includes irrigation, as well as livestock watering. It is understood that these waters would also be suitable for wildlife watering.

6.10 Category C. Propagation of Fish and Other Aquatic Life:
This category is self explanatory and does recognize the importance of other aquatic life in addition to fish.

6.11 Category D. Water Transport, Cooling and Power:
This category includes commercial and pleasure vessel activity except those small craft included in Category A. Cooling water is that water used for industrial cooling. Power production in this definition is hydro power.

6.12 Category E. Treated Wastes Transport and Assimilation:
This category includes water of such quality as to assure safe passage of fish.

Section 7. WATER USES AND WATER QUALITY CRITERIA

7.01 The following criteria are established for the purpose of maintaining water quality in all streams and their tributaries in West Virginia, draining to the North Branch of the Potomac River, including the South Branch of the Potomac River. The following stream quality standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive day drought flow with a 10-year return frequency.

(a) Present Uses: A, B1, B2, B3, C, D, E, (See Section 6).

(b) Water Quality Criteria for Present Uses.

1. Dissolved Oxygen: Not less than 5 mg/l at any time.
2. pH: Not less than 6.0 nor more than 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.

3. Temperature: Not to exceed 87°F at any time during months of May through November and not to exceed 73°F at any time during months of December through April.

4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60 °C as a daily average.

5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.

6. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average value, nor exceed this number in 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.

7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.

8. Heavy Metals: Not to exceed the following:

Constituent	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds: Not to exceed the following:

Constituent	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, B3, C, D, E.

(d) Water Quality Criteria: Same as Present Uses.

(e) In special cases where the facts warrant more stringent standards, or exceptions to the above standards, may be established in the individual case.

Section 8. WATER USES AND WATER QUALITY CRITERIA

8.01 The following criteria are established for the purpose of maintaining water quality in all streams and their tributaries in West Virginia draining to the Potomac River from its headwaters at the junction of the north and south branches of the Potomac to the

state line at Harpers Ferry, West Virginia, including the Shenandoah River. The following stream quality standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency.

(a) Present Uses: A, B1, B2, B3, C, D, E, (See Section 6).

(b) Water Quality Criteria for Present Users.

1. Dissolved Oxygen: Not less than 5 mg/l at any time.
2. pH: Not less than 6.0 nor more than 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 87°F at any time during the months of May through November and not to exceed 73°F at any time during December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average value, nor exceed this number in 20 percent of the samples examined during any month; nor exceed 2,400 per 100 ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, B3, C, D, E, (See Section 6).

(d) Water Quality Criteria: Same as Present Uses. 250

(e) In special cases where the facts warrant more stringent standards, or exceptions to the above standards, may be established in the individual case.

Section 9. WATER USES AND WATER QUALITY CRITERIA

9.01 Zone One: To include the Kanawha River and all of its tributaries from Mile Point 72 near Diamond, West Virginia to the junction of Gauley River and New River at Gauley Bridge. For purposes of maintaining water quality, the criteria proposed for Zone One will prevail also in all tributaries in Zone Two with the exception of Davis Creek and Simons Creek.

(a) Present Uses: A, B1, B3, C, D, (See Section 6).

(b) Water Quality Criteria for Present Users: Based on a minimum flow of 2490 cfs at Kanawha Falls gauge, main stem Kanawha River only. On the tributaries of the Kanawha River, Zone One, to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency.

1. Dissolved Oxygen: Not less than 5 mg/l at any time.
2. pH: Values normal for the waters in the area in question, however, generally held between 6 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 87°F at any time during the months of May through November and not to exceed 73°F at any time during December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average value, nor exceed this number in 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B3, C, D.

(d) Water Quality Criteria: Same as Present Uses.

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

9.02 Zone Two: To include the Kanawha River and all tributaries not included in Zone One from Mile Point 0 to Mile Point 72.

(a) Present Uses: B1, B2, D, E.

(b) Water Quality Criteria for Present Uses: Based on a minimum flow of 2,890 cfs, at Charleston gauge.

1. Dissolved Oxygen: Not less than 3 mg/l at any time.
2. pH: Values normal for the waters in the area in question, however, generally held between 6.0 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 93°F in any case or 10°F above ambient stream temperature, whichever is limiting.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 64 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 48-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 5,000 per 100 ml as a monthly average nor exceed this number in more than 20 percent of the samples examined during the month, nor exceed 20,000 per 100 ml in more than 5 percent of the samples.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved

strontium-90 exceed 10 pCi/l nor shall activity from dissolved alpha emitters exceed 3 pCi/l.

8. Heavy Metals: Not to exceed the following, regardless of flow:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chloride	200
Sulfate	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, C (limited), D, E.

(d) Water Quality Criteria for Future Uses:

1. Dissolved Oxygen: Not less than 4 mg/l at any time.
2. pH: Values normal for the waters in the area in question, however, generally held between 6.0 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 93°F in any case or 10°F above ambient stream temperature, whichever is limiting.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 24 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1000 per 100 ml as a monthly average value, nor exceed this number in more than 20 percent of the samples, nor exceed 2,400 per 100 ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from alpha emitters exceed 3 pCi/l.
8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01

Barium	0.50	253
Cadmium	0.01	
Chromium (Hexavalent)	0.05	
Lead	0.05	
Silver	0.05	

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

Section 10. WATER USES AND WATER QUALITY CRITERIA

10.1 The following criteria are established for all the tributaries to the Bluestone River rising in West Virginia and flowing into Virginia for the purpose of maintaining water quality. The following stream standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day flow with a 10-year return frequency.

(a) Present Uses: B2, E (See Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 3 mg/l at any time.
2. pH: Values normal for the waters in the area in question, however, generally held between 6 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 81°F at any time during the months of May through November and not exceed 73°F at any time during December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 5,000 per 100 ml as a monthly average nor exceed this number in more than 20 percent of the samples examined during the month, nor exceed 20,000 per 100 ml in more than 5 percent of the samples.

7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.

8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Cyanide	0.025
Fluoride	1.0
Phenol	0.001
Selenium	0.01

(c) Future Uses: A, B1, B2, C, E, (See Section 6).

(d) Water Quality Criteria for Future Uses:

1. Dissolved Oxygen: Not less than 4 mg/l at any time.
2. pH: Values normal for the waters in the area in question, however, generally held between 6.0 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 81°F at any time during the months of May through November and not to exceed 73°F at any time during December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1000/100 ml as a monthly average value, nor exceed this number in more than 20 percent of the samples, nor exceed 2,400 per 100 ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.

8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

10.2 The following criteria are established for the Bluestone River and all its tributaries from the Virginia-West Virginia State line to the head of the backwater of the Bluestone Reservoir for the purpose of maintaining water quality. The following stream quality standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency.

(a) Present Uses: A, B2, B3, C, E (See Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 4 mg/l at any time.
2. pH; Values normal for the waters in area in question, however, generally held between 6 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 81°F at any time during the months of May through November and not to exceed 73°F at any time during November through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average value, nor exceed this number in 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.

7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l nor shall activity from dissolved alpha emitters exceed 3 pCi/l.

8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, B3, C, D, E, (see Section 6).

(d) Water Quality Criteria: Same as Present Uses except dissolved oxygen.

1. Dissolved Oxygen: Not less than 5 mg/l at any time.

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

10.3 The following criteria are established for the East River and all its tributaries from its source to the West Virginia-Virginia State line for the purpose of maintaining water quality. The following stream standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency.

(a) Present Uses: A, B2, B3, C, E (See Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 5 mg/l at any time.
2. pH; Values normal for the waters in the area in question, however, generally held between 6.0 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 81°F at any time during the months of May through November and not to exceed 73°F at any

- time during December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
 5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
 6. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average value, nor exceed this number in 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.
 7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
 8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, B3, C, E, (See Section 6).

(d) Water Quality Criteria: Same as Present Uses.

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

10.4 The following criteria are established for the New River and all its tributaries, except the Bluestone and East Rivers, from the West Virginia-Virginia State line to the head of the backwater of the Bluestone Reservoir for the purpose of maintaining water quality. The following stream quality standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency.

(a) Present Uses: A, B2, B3, C, E (See Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 5 mg/l

at any time.

2. pH: Values normal for the waters in the area in question, however, generally held between 6.0 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 81°F at any time during the months of May through November and not to exceed 73°F at any time during December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1000/100 ml as a monthly average value, nor exceed this number in more than 20 percent of the samples, nor exceed 2,400 per 100 ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrate	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, B3, C, E (See Section 6).

(d) Water Quality Criteria for Future Uses:

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

10.5 The following criteria are established for the New River and all its tributaries from the tailwaters of the Bluestone Reservoir to the confluence with the

Gauley River, at which point the New River and the Gauley River from the Kanawha River. These criteria are established for the purpose of maintaining water quality. The following stream quality standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency.

(a) Present Uses: A, B1, B2, B3, C, D, E (See Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 5 mg/l at any time.
2. pH: Values normal for the waters in the area in question, however, generally held between 6.0 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 81°F at any time during the months of May through November and not to exceed 73°F at any time during December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1,000/100 ml as a monthly average value, nor exceed this number in more than 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05
9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfate	200
Phenol	0.001

Cyanide	0.025	260
Fluoride	1.0	
Selenium	0.01	

(c) Future Uses: A, B1, B2, B3, C, D, E (See Section 6).

(d) Water Quality Criteria for Future Uses:
Same as for Present Uses.

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

10.6 The following water quality criteria are established for the Bluestone Reservoir for the purpose of maintaining water quality.

(a) Present Uses: A, B1, C, E (See Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 5 mg/l at any time.
2. pH: Values normal for the waters in the area in question, however, generally held between 6.0 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 81°F at any time during the months of May through November and not to exceed 73°F at any time during December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average value, nor exceed this number in more than 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

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Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfate	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, C, D, E (See Section 6).

(d) Water Quality Criteria for Future Uses:
Same as for Present Uses.

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

10.7 The following criteria are established for the purpose of maintaining water quality for the Gauley River and all its tributaries from its source to the confluence with the New River, which junction forms the Kanawha River. The following stream quality standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency. The Gauley River and its tributaries lie entirely within West Virginia.

(a) Present Uses: A, B1, B2, B3, C, E, (See Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 5 mg/l at any time.
2. pH: Values normal for the waters in the area in question, however, generally held between 6 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 81°F at any time during the months of May through November and not to exceed 73°F at any time during December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average value, nor exceed this number in 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved

strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.

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8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, B3, C, E (See Section 6).

(d) Water Quality Criteria: Same as Present Uses.

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

Section 11. WATER USES AND WATER QUALITY CRITERIA.

11.01 The following criteria are established for the purpose of maintaining water quality in the Big Sandy River and all its tributaries arising in West Virginia from its mouth at Kenova, West Virginia, to the confluence of the Levisa Fork and Tug Fork. The following stream standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency.

(a) Present Uses: A, B1, B2, B3, C, D, E (See Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 5 mg/l at any time.
2. pH: Values normal for the waters in the area in question, however, generally held between 6 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 87°F at any time during the months of May through November and not to exceed 73°F at any

time during the months of December through April.

4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average value, nor exceed this number in 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l), nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, B3, C, D, E (See Section 6).

(d) Water Quality Criteria: Same as Present Uses.

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

11.02 The following criteria are established for the purpose of maintaining water quality in the Tug Fork and all its tributaries arising in West Virginia, from its confluence with Levisa Fork to its headwaters and all tributary streams to the Tug Fork crossing the State boundary from Virginia into West Virginia. The following stream quality standards are to apply at all times when flows are equal to or greater than the minimum 7-consecutive-day drought flow with a 10-year return frequency.

(a) Present Uses: A, B1, B2, B3, C, D, E (See

Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 5 mg/l at any time.
2. pH: Values normal for the waters in the area in question, however, generally held between 6.0 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 87°F at any time during the months of May through November and not to exceed 73°F at any time during months of December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average value, nor exceed this number in 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, B3, C, D, E (See Section 6).

(d) Water Quality Criteria: Same as Present Uses.

(e) In special cases where the facts warrant, more

stringent standards, or exceptions to the above standards, may be established in the individual case.

11.03 The following criteria are established for the purpose of maintaining water quality in the Guyandotte River and all its tributaries from its mouth at Huntington, West Virginia, to its headwaters. (The Guyandotte River Basin is wholly located within West Virginia). The following stream quality standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency.

(a) Present Uses: A, B1, B2, B3, C, D, E (See Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 5 mg/l at any time.
2. pH: Values normal for the waters in the area in question, however, generally held between 6.0 and 8.5, except streams having significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 87°F at any time during the months of May through November and not to exceed 73°F at any time during the months of December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average value, nor exceed this number in 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l), nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
8. Heavy metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, B3, C, D, E (See Section 6).

(d) Water Quality Criteria: Same as Present Uses.

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

Section 12. WATER USES AND WATER QUALITY CRITERIA.

12.01 The following criteria are established for the purpose of maintaining water quality in the main stem of the Ohio River from the Ohio-Pennsylvania-West Virginia State line to the Ohio-Kentucky-West Virginia State line: The following stream quality standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency.

(a) Present Uses: A, B1, B2, B3, C, D, E, (See Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 5.0 mg/l during at least 16 hours of any 24-hour period, nor less than 3.0 mg/l at any time.
2. pH: No values below 5.5 nor above 9.0 and daily average (or median) values preferably between 6.5 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 93°F at any time during the months of May through November, and not to exceed 73°F at any time during the months of December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 24 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 48-hour median tolerance limit, except that other limiting concentrations may be used in specific cases when justified on the basis of available evidence and approved by the appropriate agency.

6. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average value; nor exceed this number in 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.
 7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l), nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
 8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05
 9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Phenol	0.001
Cyanide	0.001
Fluoride	1.0
Selenium	0.01
- (c) Future Uses: A, B1, B2, B3, C, D, E (See Section 6).
- (d) Water Quality Criteria for Future Uses:
1. Dissolved Oxygen: Not less than 5 mg/l at any time.
 2. pH: Values normal for the waters in the area in question, however, generally held between 6 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
 3. Temperature: Not to exceed 87°F at any time during the months of May through November and not to exceed 73°F at any time during months of December through April.
 4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
 5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
 6. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average value, nor exceed this number in 20 percent of the samples examined during any month, nor exceed 2,400 per

- 100 ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
 8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05
 9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01
- (e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.
- 12.02 The following criteria are established for the purpose of maintaining water quality in all the tributaries of the Ohio River in West Virginia, excluding the Big Sandy, Guyandotte and Kanawha Rivers. The following stream standards are to apply at all times when the flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency.
- (a) Present Uses: A, B1, B2, B3, C, D, E (See Section 6).
- (b) Water Quality Criteria for Present Uses:
1. Dissolved Oxygen: Not less than 5 mg/l at any time.
 2. pH: Values normal for the waters in the area in question, however, generally held between 6.0 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
 3. Temperature: Not to exceed 87°F at any time during the months of May through November and not to exceed 73°F at any time during months of December through April.
 4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
 5. Toxic Substances: Not to exceed 1/10 of

the 96-hour median tolerance limit.

6. Bacteria: The Coliform group is not to exceed 1000/100 ml as a monthly average value, nor exceed this number in more than 20 percent of the samples examined during any month, nor exceed 2,400 per ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, B3, C, D, E (See Section 6).

(d) Water Quality Criteria for Future Uses:
Same as for Present Uses.

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

Section 13. WATER USES AND WATER QUALITY CRITERIA.

13.01 The following criteria are established for the purpose of maintaining water quality in the Monongahela River and all its tributaries from the West Virginia-Pennsylvania State line to the confluence of the Tygart Valley and West Ford Rivers.

(a) Present Uses: A, B1, B2 (See Section 6).

(b) Water Quality Criteria for Present Uses:

Based on a minimum flow of 345 cfs at Lock and Dam # 8, main stem Monongahela River. On the tributaries of the Monongahela River the following stream quality standards are to apply at all times when flows are equal to or greater than the minimum

mean 7-consecutive-day drought flow with a 10-year²⁷⁰ return frequency.

1. Dissolved Oxygen: Not less than 5 mg/l at any time.
2. pH: Values normal for the waters in the area in question, however, generally held between 6.0 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 87°F at any time during the months of May through November and not to exceed 73°F at any time during months of December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average nor exceed this number in more than 20 percent of the samples examined during any month, nor exceed 2,400 per ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, B3, C, D, E (See Section 6).

(d) Water Quality Criteria:
Same as Present Uses as modified below.

1. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average value, nor exceed this number in 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.
- (e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.
- 13.02 The following criteria are established for the purpose of maintaining water quality in the West Fork River and all its tributaries from its mouth to its headwaters. The following stream quality standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency.

(a) Present Uses: A, B1, B2, B3, C, D, E (See Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 5 mg/l at any time.
2. pH: Values normal for the waters in the area in question, however, generally held between 6.0 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 87°F at any time during the months of May through November and not to exceed 73°F at any time during the months of December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1,000/100 ml as a monthly average value, nor exceed this number in more than 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50

Cadmium	0.01	272
Chromium (Hexavalent)	0.05	
Lead	0.05	
Silver	0.05	

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, E3, C, D, E (See Section 6).

(d) Water Quality Criteria: Same as for Present Uses.

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

13.03 The following criteria are established for the purpose of maintaining water quality in the Tygart Valley River and all its tributaries from its mouth to its headwaters. The following stream standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency.

(a) Present Uses: A, B1, B2, B3, C, D, E (See Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 5 mg/l at any time.
2. pH: Values normal for the waters in question, however, generally held between 6.0 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 87°F at any time during the months of May through November and not to exceed 73°F at any time during months of December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 1000/100 ml as a monthly average value; nor exceed this number in more than 20 percent of the samples examined during any month; nor exceed 2,400 per 100 ml on any day.

7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.

8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, B3, C, D, E (See Section 6).

(d) Water Quality Criteria: Same as for Present Uses.

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

13.04 The following criteria are established for the purpose of maintaining water quality in the Cheat River and all its tributaries from the West Virginia-Pennsylvania State line to its headwaters. The following stream quality standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency.

(a) Present Uses: A, B1, B2, B3, C, D, E (See Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 5 mg/l at any time.
2. pH: Values normal for the waters in the area in question, however, generally held between 6.0 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 87°F at any time during the months of May through November and not to exceed 73°F at any time during the months of December

through April.

4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.

5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.

6. Bacteria: The Coliform group is not to exceed 1000/100 ml as a monthly average value, nor exceed this number in more than 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.

7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.

8. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

(c) Future Uses: A, B1, B2, B3, C, D, E (See Section 6).

(d) Water Quality Criteria: Same as for Present Uses.

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

13.05 The following criteria are established for the purpose of maintaining water quality in those tributaries of the Youghiogheny River in West Virginia which are interstate with Maryland. The following stream quality standards are to apply at all times when flows are equal to or greater than the minimum mean 7-consecutive-day drought flow with a 10-year return frequency.

(a) Present Uses: B1, E (See Section 6).

(b) Water Quality Criteria for Present Uses:

1. Dissolved Oxygen: Not less than 5 mg/l

at any time.

2. pH: Values normal for the waters in the area in question, however, generally held between 6.0 and 8.5, except streams carrying significant quantities of acid mine drainage shall have a pH of not less than 5.5.
3. Temperature: Not to exceed 87°F at any time during the months of May through November and not to exceed 73°F at any time during the months of December through April.
4. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60°C as a daily average.
5. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
6. Bacteria: The Coliform group is not to exceed 5,000 per 100 ml as a monthly average nor exceed this number in more than 20 percent of the samples examined during the month, nor exceed 20,000 per 100 ml in more than 5 percent of the samples.
7. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
5. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

9. Other Compounds:
- | Constituents | Concentration mg/l |
|--------------|--------------------|
| Nitrates | 45 |
| Chlorides | 100 |
| Sulfates | 200 |
| Phenol | 0.001 |
| Cyanide | 0.025 |
| Fluoride | 1.0 |
| Selenium | 0.01 |

(c) Future Uses: B1, E (See Section 6).

(d) Water Quality Criteria: Same as for Present Uses.

(e) In special cases where the facts warrant, more stringent standards, or exceptions to the above standards, may be established in the individual case.

Section 14. COIN OPERATED AND OTHER COMMERCIAL LAUNDRIES 276

14.01 The increasing appearance of coin operated and other commercial laundries, particularly in unsewered areas, has led to a variety of waste water treatment problems.

In order to establish minimum requirements governing construction of such waste water handling facilities and in accordance with Chapter 20, Article 5A, Code of West Virginia, the following Administrative Regulations are established.

14.02 Coin operated laundries and other commercial laundries located within the corporate limits of a West Virginia Municipality, Town, or within the boundaries of a Public Service District, or Sanitary District, or a privately owned installation having an approved sewage treatment facility shall divert waste water to these systems for treatment.

(a) Laundry discharging directly to sewer. A laundry without pretreatment of the waste water connected to a sewer requires adherence to local plumbing codes and to any special regulations regarding acceptance of waste at the sewage treatment plant.

(b) Laundry with pre-treatment and discharge directly to sewer. The laundry shall provide equipment for removal of lint from the water.

14.03 Coin operated and other commercial laundries located outside of the corporate limits of a West Virginia municipality or Town, or the boundaries of a Public Service District or Sanitary District not served by an approved sewage treatment facility shall either divert waste water to an approved sewage treatment facility or shall be governed by the following:

1. Construction and operation of such treatment facilities shall meet the following minimum requirements in addition to those described elsewhere by law or Administrative Regulation series one and two.

- (a) Substantial removal of all settleable solids.
- (b) Ninety percent removal of 5-day bio-chemical oxygen demand.
- (c) Detergent level ABS or LAS shall be reduced to such level that the discharge shall contain no more than 0.5 mg/l of ABS or LAS.
- (d) Chlorination of final effluent is required at the initial installation. A chlorination contact chamber shall provide a contact period of at least 15 minutes with a residual of 0.5 mg/l of chlorine at maximum flow.

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- (e) Laundry discharging water to a receiving stream used primarily for recreational pursuit and supporting sport fisheries shall in addition to items (a) through (d) provide tertiary treatment for additional BOD removal to 10 mg/l.

2. Laundry with no waste water discharge. A laundry may be located where no discharge of the waste water can be made to a sanitary sewer or a receiving stream. In these cases, holding tanks shall be provided for wastes and the waste must be transported to an approved waste water treatment plant for treatment.

14.04 The following systems are non-allowable and will not be permitted:

- (a) Septic tanks with or without leach fields.
- (b) Cess pools.
- (c) Direct or indirect discharge of untreated or inadequately treated laundry waste water to a West Virginia water.

Section 15. COIN OPERATED AND OTHER COMMERCIAL CAR WASHING ESTABLISHMENTS

15.01 The increasing appearance of coin operated and other commercial car washing establishments, particularly in unsewered areas, has led to a variety of waste water treatment problems.

In order to establish minimum requirements governing construction of such waste water handling facilities and in accordance with Chapter 20, Article 5A, Code of West Virginia, the following Administrative Regulations are established.

15.02 Coin operated and other commercial car washing establishments located within the corporate limits of a West Virginia Municipality, Town, or within the boundaries of a Public Service District, Sanitary District or privately owned installation having an approved sewage treatment facility shall divert waste water to these systems for treatment:

- (a) Carwash with discharge directly to sewer. A carwash discharging to the sewer without pretreatment of the waste water requires adherence to local plumbing codes and to any special local regulations regarding acceptance of waste at the sewage treatment plant.
- (b) Carwash with pre-treatment system discharging directly to sewer. A device to prevent large items from entering the sewer lines shall be required. A settling tank shall be required to remove settleable solids from the waste water.
- (c) Coin operated and other commercial car washing establishments located within the corporate limits of a West Virginia Municipality, Town, or within the boundaries of a Public Service District or Sanitary District having an approved sewage

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treatment facility and not wishing nor required to utilize this facility must proceed under Section 15.03 of this regulation.

15.03 Any coin operated or other commercial establishment located outside the corporate limits of a West Virginia Municipality or Town, or outside the boundaries of a Public Service District or Sanitary District, or within the corporate limits of a West Virginia Municipality or Town, or the boundaries of a Public Service District or Sanitary District not served by an approved sewage treatment facility shall either divert waste water to an approved sewage treatment facility or shall be governed by the following:

1. Construction and operation of such treatment facilities shall meet the following minimum requirements in addition to those prescribed elsewhere by law or Administrative Regulations series one and two.

- (a) Substantial removal of all settleable solids.
- (b) Ninety percent removal of 5-day bio-chemical oxygen demand.
- (c) Detergent level ABS or LAS shall be reduced to such level that the discharge shall contain no more than 0.1 mg/l of ABS or LAS.
- (d) Chlorination of final effluent is required at the initial installation, if domestic sewage is to be treated within the installation. A chlorination contact chamber shall provide a contact period of at least 15 minutes with a residual of 0.5 mg/l of chlorine at maximum flow.
- (e) A grease trap shall be installed and properly maintained within the system to prevent oils and grease entrapment with waste water effluent.
- (f) A grit removal chamber shall be installed in such a manner to be readily cleaned.
- (g) A car wash discharging waste water to a receiving stream used primarily for recreation pursuits and supporting sport fisheries shall in addition to items (a) through (f) provide tertiary treatment equipment in addition to secondary treatment. Tertiary treatment provides for additional BOD removal to 10 mg/l in the effluent.

2. Carwash with no waste water discharge. Carwashes may be located where no discharge of the waste water can be made to a sanitary sewer or a receiving stream. In these cases, holding tanks shall be provided for wastes and the wastes must be transported to an approved waste water treatment plant for treatment.

3. Carwash re-using waste water. Carwashes employing a re-use system shall provide removal facilities for settleable materials. These materials must be transported to an approved disposal site.

15.04 The following systems are non-allowable and will not be permitted.

- (a) Septic tanks with or without leach fields.
- (b) Cess pools.
- (c) Direct or indirect discharge of untreated or improperly treated waste water from coin operated and other commercial car washing establishments to West Virginia waters.

Section 16. TROUT STREAMS

16.01 Trout streams, headwaters of streams, trout lakes and reservoirs and the hypolimnion of lakes and reservoirs containing salmonids should not be warmed. No heated effluents should be discharged in the vicinity of spawning areas. These streams include but are not limited to the following streams or portions thereof: Dry Fork, a tributary of the Tug Fork River; East River and Rich Creek, tributaries of the New River; Potts Creek, a tributary of the James River; Opequon Creek, a tributary of the Potomac River; Mill Creek, a tributary of Opequon Creek; the South Branch of the Potomac River from Petersburg to its headwater; and Long Marsh Run, a tributary of the Shenandoah River.

(a) Water Quality for Trout Streams.

1. During any month of the year, heat should not be added to a stream in excess of the amount that will raise the temperature of the water more than 5 °F. (based on the minimum expected flow for that month). In lakes and reservoirs, the temperature of the epilimnion should not be raised more than 2 °F by the addition of heat of artificial origin.
2. The normal daily and reasonable temperature fluctuations that existed before the addition of heat due to other than natural causes should be maintained.
3. The maximum temperatures for cold waters are expressed in the following table:

	Daily Mean °F	Hourly Max. °F
October–April	50	55
September & May		
transition period	58	62
June–August	66	70

4. Dissolved Oxygen: Not less than 6.0 mg/l at any time.
5. pH: Not less than 6.0 nor more than 8.5.

6. Threshold Odor: Threshold odor not to exceed a threshold odor number of 8 at 60 °C as a daily average.
7. Toxic Substances: Not to exceed 1/10 of the 96-hour median tolerance limit.
8. Bacteria: The Coliform group is not to exceed 1,000 per 100 ml as a monthly average value, nor exceed this number in 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml on any day.
9. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l) nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
10. Heavy Metals: Not to exceed the following:

Constituents	Concentration mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

11. Other Compounds: Not to exceed the following:

Constituents	Concentration mg/l
Nitrates	45
Chlorides	100
Sulfates	200
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

Section 17. WATER PURIFICATION WASTE WATER CONTROL MEASURE

17.01 Waste Disposal — Provision must be made for proper disposal of wastes from water treatment plants. Such wastes include but are not limited to those emanating from sanitary facilities, laboratories, clarification facilities, softening facilities, and filter backwash. Discharges shall be governed by Chapter 20, Article 5A, Code of West Virginia and the following regulations:

(a) The following means of waste and sludge disposal may be considered:

1. Lagoon design must provide the following:
 - a. Location free from flooding.
 - b. Dikes, deflecting gutters or other means of diverting surface water when necessary.

- c. A minimum depth of 4 to 5 feet.
 - d. Multiple cell.
 - e. Adjustable decanting devices.
 - f. Convenient cleaning.
2. Sludge beds for lime softening sludge or other sludges must provide the following:
- a. Location free from flooding.
 - b. Multiple beds, each designed for at least one year's storage.
 - c. Size of sludge beds will be governed by the concentration of solids to be disposed of with an ultimate depth of 12 inches dry basis.
 - d. Distribution channels may be required for spreading sludge over entire area.
 - e. Easy access roads and loading ramps with proper under drains must be provided.
 - f. Tank Truck — Trucking wet sludge to agricultural lands or disposal areas requires proper handling, vehicles and equipment to permit hauling and spreading without creation of nuisances. It is necessary to provide sludge holding facilities for use during times that trucks cannot operate.
3. Community Wastewater Treatment Facility—Discharges to sewer system, and their treatment facilities depend on type of treatment, rate of discharge, plant design capacity, character of waste, and local conditions.
4. Other Methods — These include holding tanks, vacuum filters, centrifuging and recalcining. Detailed studies must be made to justify their use.
5. Sanitary Waste — The sanitary waste from water treatment plants, pumping stations, etc., must receive treatment. Waste from these facilities must be discharged either directly to a sanitary sewer system with approved treatment or to an individual waste disposal facility providing suitable treatment. The effluent must be acceptable for discharge to the surface of ground waters.

OHIO RIVER VALLEY WATER SANITATION COMMISSION

An interstate agency representing: Illinois • Indiana • Kentucky • New York • Ohio • Pennsylvania • Virginia • West Virginia. Headquarters: 414 Walnut Street, Cincinnati, Ohio 45202

Notice of Requirements (Standards Number 1-70 and 2-70) Pertaining to Sewage and Industrial Wastes Discharged to the Ohio River

Issued _____ to _____

You are hereby notified that on November 13, 1970, the Ohio River Valley Water Sanitation Commission, acting in accordance with and pursuant to authority contained in Article VI of the Ohio River Valley Water Sanitation Compact, established, subject to revision as changing conditions require, the attached standards for the modification or treatment of all sewage from municipalities or other political subdivisions, public or private institutions, corporations, or watercraft, and for the modification or treatment of all industrial wastes discharged or permitted to flow into the Ohio River from the point of confluence of

the Allegheny and Monongahela rivers at Pittsburgh, Pennsylvania, designated as Ohio River mile point 0.0, to Cairo Point, Illinois, located at the confluence of the Ohio and Mississippi rivers, and being 981.0 miles downstream from Pittsburgh, Pennsylvania.

Under terms and provisions of the Ohio River Valley Water Sanitation Compact all sewage from municipalities or other political subdivisions, public or private institutions, corporations or watercraft and all industrial wastes discharged or permitted to flow into the Ohio River will be required to be modified or treated to the extent specified in the attached standards.

As one of the municipalities, subdivisions, institutions or corporations subject to the provisions of the Ohio River Valley Water Sanitation Compact, you are herewith called upon to consult with the

not later than _____ regarding waste-control facilities and procedures that will be required to achieve compliance with these standards.

Chairman

Executive Director and Chief Engineer

Commissioners for

The following definitions and application procedures are incorporated as part of Pollution Control Standards Nos. 1-70, 2-70:

(a) "Sewage" means the water carried human or animal wastes from residences, buildings, industrial, commercial or governmental establishments, public or private institutions, watercraft and floating facilities, or other places, together with such groundwater infiltration and surface-waters as may be present. The admixture with sewage, as defined, of industrial wastes, as hereinafter defined, shall also be regarded as sewage;

(b) "Industrial waste," other than cooling water, means any liquid, gaseous, solid material or waste substance or combination thereof including garbage, refuse, decayed wood, sawdust, shavings, bark, sand, lime, cinders, ashes, offal, oil, tar, dyestuffs, acids, chemicals, heat and all discarded matter resulting from any process or operation, including storage and transportation, manufacturing, com-

mercial, agricultural and government operations, or from the development and recovery of any natural resources;

(c) "Cooling water" means water used as a heat transfer medium to which no process, waste or other materials, exclusive of chlorine, are added intentionally or unintentionally prior to discharge;

(d) "Substantially complete removal" means removal to the lowest practicable level attainable with current technology;

(e) Methods for determining waste constituents and characteristics shall be those set forth in the most recent edition of "Standard Methods for the Examination of Water and Wastewater," prepared and published jointly by the American Public Health Association, American Water Works Association, and the Water Pollution Control Federation, except that such other methods may be used as are approved by the Commission.

POLLUTION CONTROL STANDARD NO. 1-70

All sewage from municipalities or political subdivisions, public or private institutions, or installations, or corporations, or watercraft, and all industrial wastes, other than cooling water as hereinafter defined, discharged or permitted to flow into the Ohio River from the point of confluence of the Allegheny and Monongahela rivers at Pittsburgh, Pennsylvania, designated as Ohio River mile point 0.0, to Cairo Point, Illinois, located at the confluence of the Ohio and Mississippi rivers, and being 981.0 miles downstream from Pittsburgh, shall be so treated or otherwise modified as to provide for:

- A. Substantially complete removal of settleable solids;
- B. Substantially complete removal of oil (in whatever state, including free, emulsified, dispersed and dissolved oils), debris, scum, and other floating materials;
- C. Reduction of suspended solids, dissolved solids and other materials to such degree that the discharge will not produce turbidity, color or odor in the river, or impart taste to potable water supplies, or cause the tainting of fish flesh;
- D. Reduction of any and all constituent materials to such a degree that the concentration thereof, singly or in combination, in any discharge is not harmful to human health, and reduction of the following

chemicals to such a degree that the concentrations thereof in any discharge do not exceed (1) the limits specified in the tabulation below or (2) such lower limits as may be required for compliance with subparagraph (E) of this Pollution Control Standard No. 1-70:

Inorganic chemicals	Limiting concentration (mg/l)
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium (hexavalent)	0.05
Lead	0.05
Mercury	0.005
Selenium	0.01
Silver	0.05
Organic chemicals	
Cyanide	0.2
Pesticides	
Aldrin	0.017
Chlordane	0.003
DDT	0.042
Dieldrin	0.017
Endrin	0.001
Heptachlor	0.018
Heptachlor epoxide	0.018
Lindane	0.056
Methoxychlor	0.035
Organic phosphates plus carbamates (as parathion equivalent cholinesterase inhibition)	0.1
Toxaphene	0.005
Herbicides	
2,4-D plus 2,4,5-T plus 2,4,5-TP	0.1

- E. Reduction of any material or, if necessary, all materials contained in any discharge which singly or in combination are toxic or harmful to aquatic life to such a degree or degrees that the calculated concentration(s) of such material or materials in the river does not exceed one-twentieth of the 96-hour median tolerance limit (96-hr. TL_m) for aquatic life;
- F. Reduction of radioactive materials to such degree that (1) concentrations of *unidentified* radionuclides in the discharge do not exceed (a) 30 pCi or (b) limiting values specified by the Atomic Energy Commission for water in which certain radionuclides are known to be absent, as set forth in Column 2, Table II, Paragraph 3.C, Notes to Appendix B, Title 10, Chapter 1, Code of Federal Regulations (January 1, 1970), or (2) concentrations of *identified* radionuclides in the discharge do not exceed limiting values for water specified by the Atomic Energy Commission, as set forth in Column 2, Table II, Appendix B, Title 10, Chapter 1, Code of Federal Regulations (January 1, 1970);
- G. Reduction of fecal coliform bacteria to such degree that (1) during the months of May through October fecal coliform density in the discharge does not exceed 200 per 100 ml as a monthly geometric mean (based on not less than ten samples per month), nor exceed 400 per 100 ml in more than ten percent of the samples examined during a month, and (2) during the months of November through April the density does not exceed 1,000 per 100 ml as a monthly geometric mean (based on not less than ten samples per month), nor exceed 2,000 per 100 ml in more than ten percent of the samples examined during a month;
- H. Control of hydrogen ion concentration to such degree that the pH is not less than 5.0 nor greater than 9.0;
- I. Reduction in 5-day biochemical-oxygen-demand load (pounds per day) of not less than 92 percent (as a monthly-average value), provided, however, that a lesser degree of reduction may be applied, but not less than 85 percent (monthly-average value), if as a result the biochemical-oxygen-demand (BOD) load does not exceed that amount which will increase the BOD of the river, on a calculated basis, by more than 0.05 milligrams per

liter at flows equal to or exceeding "critical" flow values specified in the following table:

River Reach		Critical flow in cfs*
From	To	
Pittsburgh (mi. 0.0)	Willow Is. Dam (161.7)	6,600
Willow Is. Dam (161.7)	Gallipolis Dam (279.2)	7,700
Gallipolis Dam (279.2)	Meldahl Dam (436.2)	9,900
Meldahl Dam (436.2)	McAlpine Dam (605.8)	12,100
McAlpine Dam (605.8)	Uniontown Dam (846.0)	14,300
Uniontown Dam (846.0)	Smithland Dam (918.5)	20,000
Smithland Dam (918.5)	Cairo Point (931.0)	48,500

* Minimum 7-day flow once in ten years.

- J. Reduction of heat content to such degree that the aggregate heat-discharge rate from the municipality, subdivision, institution, installation or corporation, as calculated on the basis of discharge volume and temperature differential (temperature of discharge minus average upstream river temperature), does not exceed the amount calculated by the following formula, provided, however, that in no case shall the aggregate heat-discharge rate be of such magnitude as will result in a calculated increase in river temperature of more than 5 deg. F.;

$$\text{Allowable heat-discharge rate (Btu/sec)} = 62.4 \times \text{river flow (cfs)} \times (T_A - T_R) \times 90\%$$

Where:

T_A = Allowable maximum temperature (deg. F.) in the river as specified in the following table:

	T_A		T_A
January	50	July	83
February	50	August	89
March	60	September	87
April	70	October	78
May	80	November	70
June	87	December	57

T_R = River temperature (daily average in deg. F.) upstream from the discharge

River flow = measured flow but not less than critical flow values specified in the following table:

River Reach		Critical flow in cfs*
From	To	
Pittsburgh, Pa. (mi. 0.0)	Willow Is. Dam (161.7)	6,500
Willow Is. Dam (161.7)	Gallipolis Dam (279.2)	7,400
Gallipolis Dam (279.2)	Meldahl Dam (436.2)	9,700
Meldahl Dam (436.2)	McAlpine Dam (605.8)	11,900
McAlpine Dam (605.8)	Uniontown Dam (846.0)	14,200
Uniontown Dam (846.0)	Smithland Dam (918.5)	19,500
Smithland Dam (918.5)	Cairo Point (931.0)	48,100

* Minimum daily flow once in ten years.

All cooling water from municipalities or political subdivisions, public or private institutions, or installations, or corporations discharged or permitted to flow into the Ohio River from the point of confluence of the Allegheny and Monongahela rivers at Pittsburgh, Pennsylvania, designated as Ohio River mile point 0.0 to Cairo Point, Illinois, located at the confluence of the Ohio and Mississippi rivers, and being 981.0 miles downstream from Pittsburgh, Pennsylvania, shall be so regulated or controlled as to provide for reduction of heat content to such degree that the aggregate heat-discharge rate from the municipality, subdivision, institution, installation or corporation, as calculated on the basis of discharge volume and temperature differential (temperature of discharge minus upstream river temperature) does not exceed the amount calculated by the following formula, provided, however, that in no case shall the aggregate heat-discharge rate be of such magnitude as will result in a calculated increase in river temperature of more than 5 deg. F.:

$$\text{Allowable heat-discharge rate (Btu/sec)} = 62.4 \times \text{river flow (cfs)} \times (T_A - T_R) \times 90\%$$

Where:

T_A = Allowable maximum temperature (deg. F.) in the river as specified in the following table:

	T_A		T_A
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Meldahl Dam (436.2)	McAlpine Dam (605.8)	11,900
McAlpine Dam (605.8)	Uniontown Dam (846.0)	14,200
Uniontown Dam (846.0)	Smithland Dam (918.5)	19,500
Smithland Dam (918.5)	Cairo Point (981.0)	48,100

*Minimum daily flow once in ten years.

E. Henry

MR. STEIN: Thank you.

Are there any comments or questions?

MR. RILEY: I have several questions.

Several of your comments I think we have addressed in the statement presented this morning, particularly with regard to the schedule and further clarification of some of the recommendations, particularly with regard to the dates.

I do want to say that, as we pointed out in this morning's statement, we do not propose nor intend to revise water quality standards through this enforcement proceeding. We are here to work on a cooperative basis to try to fill in the gaps of the ongoing programs, particularly with regard to interim dates, and also to take a look at what additional measures may be necessary on a joint basis.

MR. STEIN: Are there any other comments or questions?

(No response.)

I would like to address myself to one of the points that you made, Mr. Henry. That is, you have emphasized again and again the cooperative nature of the program. I would agree with that. But then you indicated -- and again I am not sure that this is

E. Henry

characteristic of what I have heard from the States -- when we have a violation you are thinking in terms perhaps of a 180-day notice rather than a conference.

The thought we had was if we are going to have a cooperative program, possibly one of the choices we have is to sit down together with you in a conference of this kind. Because when we go the 180-day notice route, this is a Federal action.

I would think that the answer to your question as to why we called the conference is we recognized, as you pointed out, there was some slippage in some of the dates, and we picked a procedure where we could sit down and discuss this with you and see if we could work it out jointly with the States and the interstate agencies. This to our notion might have been the preferable approach. I don't know how you feel about that.

MR. HENRY: Mr. Chairman, I agree. I think maybe the problem here is a matter of terms. Take the term "enforcement conference." I'm afraid that the people from the States -- I'm speaking for myself only at this point -- when an enforcement conference is called in an area feel that there is a connotation there of failure of the State in its efforts to abate pollution and that, since the States have failed, the Federal Government is

E. Henry

coming in to see that something is done about it.

This is the feeling that we get from an enforcement conference. It's my understanding this isn't really the way it's supposed to be, and for that reason I think maybe-- I don't know if you can change the name of the conference or what, but it seems to have a bad light in terms of what the State is doing. It appears that Federal Agencies have said the State can't do the job and "we're coming in."

MR. STEIN: I don't think that is the issue at all. The point is we recognize in any complicated problem -- and I am just trying to state a fact -- where you have a list of maybe 30, 40, or 50 sources of pollution, and the Federal Government and the State set up a date like January 1, 1971, some "magic" date, I have yet to see that they have moved together like a symphony orchestra and they all finish on the same beat. It just doesn't happen.

Now, if it doesn't happen that way -- and I think it is indicated here some 29 or 30 of the industries are, to the best of the knowledge and belief of our investigating staff, on schedule, and it is indicated that you are going ahead with the program -- where we have this kind of slippage we have to operate only the way we are

E. Henry

authorized to do by Federal law, as you have to do by State law.

We have several alternatives. We can go the 1899 Act against industry. We can issue 180-day notices against either industry or municipality. If we do either one of those, that's a purely Federal activity. Or we can employ the conference technique, and this is the technique where we sit down with the State and the interstate agency, examine the situation, and see where we move from here and also see if we can possibly let the solution after the conference be arrived at under State law rather than Federal law.

In other words, it would seem to me that this is the cooperative technique where we are stretching our hands out to you, not the technique where we are criticizing the State for noncompliance at all. That isn't the idea of this.

As you know, I have worked with West Virginia. I have been familiar with your program for many years. You have done a very good job. I would say, considering the resources available to you, you have done a really excellent job in building up the program.

I wouldn't ask you to do or achieve anything that the Federal Government with its big program can't achieve.

E. Henry

And I don't know that we can do any better. But I do think that working together we need all the hands we can get and we can come to an equitable solution.

The purpose of this is to sit down with you not in the sense of criticism of a State program but in a cooperative effort.

And I'm not sure if we employ those other sources whether you are going to feel that way or your industries and cities are going to feel that way. Again I would suspect -- and I'm just saying this -- that an industry or a municipality might rather go through the conference technique and have you get in touch with them again than be served with a paper to come to a Federal court and appeal.

This is something I really do think we have to consider. That is why I hope you would possibly rethink a little bit the conference technique, because I do think it serves a purpose.

One of the other purposes too is that we can get the whole sweep of the river basin and not just pick one, two, three, or four where the cases just happen to be ready for action under the technique that is available to us under that portion of the statute.

For these reasons we are going this way here.

E. Henry
J. Lowell Knauff

The last thing we have in mind is to criticize the State agency.

Are there any other comments or questions?

(No response.)

Thank you.

I have received a written statement from J. Lowell Knauff, of Weirton, West Virginia, which I will place in the record at this time.

STATEMENT OF

J. LOWELL KNAUFF

WEIRTON, WEST VIRGINIA

This is the written statement of my testimony at the October 13, 1971 public conference on the interstate pollution of the Ohio River in the Wheeling, West Virginia area.

My name is J. Lowell Knauff. I have been a resident of Weirton, West Virginia for nearly 2 years. I am also pastor of Resurrection Lutheran Church in Weirton. I wish to offer this written testimony as a concerned citizen, and I write for myself and not for my church, nor the ministerial associations to which I belong, although the thoughts expressed are held by many with whom I associate.

The people of God have always taken a great interest in water. The Old Testament people appreciated

J. Lowell Knauff

water deeply, for God had created it in the first place. The Creator fashioned water out of nothing, the water which sustained and supported life.

The New Testament people also had a respect for water as it was incorporated in the rites and rituals of the times -- and as it is to this day.

From a theological point of view, water is extremely important. As one of God's good gifts, it is to be used in a thoughtful manner by God's children.

Today, God's people attempt to cooperate with the Creator in controlling and using water. Our total life is based on water and the way we use it. Sixty percent of the weight of our body is water. It takes 65,000 tons of water to make one ton of steel, 7,500 tons for a bushel of wheat, and 800,000 tons for an acre of cotton. The water vapor which surrounds our planet keeps the sun's warmth from escaping through radiation as it does on the cold, bare moon.

Each person in the United States uses about 100 gallons of water a day. That still leaves 1,101,117,142,900 gallons of water on the earth. But the channeling and conservation of water are becoming a major problem -- getting good water to the right people at the right time.

Therefore, it is of vital importance that God's

J. Lowell Knauff

people speak out and do all they can to manage well the water in faucets, reservoirs, rivers, etc. And these people also must always have the question before them of what kind of water do they want in and around them.

Our rivers and lakes belong to the people. They ought not to be the private dumping grounds for private industries. The people have a right to pure drinking water. The people have a right to recreational uses of water in its areas. Since the citizens have rights and the rivers are the public domain, the people have a right to charge those who despoil them and to spend the money charged in restoring the quality of water to its original state.

There is no reason why residents of a certain area, like the Wheeling area, should be made to pay for cleaning up the water which industry has used without any charge or penalty in additional taxes to carry away its waste products. Waste disposal should be a legitimate cost of production.

It is my opinion that each polluter must be assessed and charged with penalties in substantial sums based on the quantity of the waste discharged and also on its relative strength and toxicity.

Thank you.

J. E. Richards

MR. STEIN: May we hear from Ohio, Mr. Richards?

STATEMENT OF

JOHN E. RICHARDS

ACTING CHIEF, DIVISION OF ENGINEERING

OHIO DEPARTMENT OF HEALTH

COLUMBUS, OHIO

MR. RICHARDS: Mr. Stein, I have not had any request from anybody from Ohio to make a statement. I would like to say now if there are any people from Ohio who want to enter anything in the record, please see me after this presentation.

Mr. Chairman, fellow conferees, ladies and gentlemen, my name is John E. Richards. I am Acting Chief, Division of Engineering, Ohio Department of Health. The Division of Engineering serves as the technical arm of the Ohio Water Pollution Control Board. I am representing Dr. Thomas A. Gardner, who is Acting Director of Health and Chairman of the Ohio Water Pollution Control Board, and I wish to make the following statement on his behalf.

Description of the Area

The Ohio portion of the drainage basin of the Ohio River in the Wheeling, West Virginia - Steubenville, Ohio area extends some 20 to 25 miles to the west of the Ohio River for a total drainage area of 714 square miles.

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The major streams draining this area are Yellow Creek, Cross Creek, Short Creek, Wheeling Creek, and McMahon Creek. As can be seen from Figure 1 (Appendix A), a significant portion of each of these streams is affected by the drainage from coal mines. A number of these mines have been worked out and abandoned.

Municipal Wastewater Treatment Facilities

Approximately 180,000 persons reside in the area, of which 85,000 live in the cities and villages along the river and 25,000 live in organized communities within the interior of the area. All of the communities along the main stem are served by municipal wastewater treatment facilities which provide primary treatment and disinfection. In addition, chemical treatment is provided by the facilities of the city of Steubenville.

I might add here that these are facilities that have been installed in accordance with the requirements of the Ohio Water Pollution Control Board.

Four inland communities, as well as 2 county sewer districts, are served by secondary wastewater treatment facilities. Two other inland communities and 1 sewer district are served by primary facilities. No central treatment facilities are provided for the village of Adena, in Jefferson County. The village* is, however,

*See end of transcript for correction.

planning to join a proposed county sewer district system.

Information with respect to the treatment facilities provided by the communities along the Ohio River, along with data on their performance for the year 1970, is given in Table 1 (Appendix B). Similar data for the facilities that serve the inland communities is given in Table 2 (Appendix B).

Industrial Wastewater Treatment Facilities

The industrial wastewaters that are discharged to the main stream include those from five steel plants, two paper mills, three fossil fuel electric generating plants, a railroad refueling station, and a producer of nonferrous metals. The blast furnaces and rolling mills are major sources of suspended solids. In addition, the rolling mills are a significant source of oils.

Other critical constituents of certain steel mill wastes are acids, alkalis, complexed cyanides, phenols, and hexavalent chromium. There is some question with regard to the toxicity of the complexed cyanides from blast furnaces, and I request this matter be taken up by the conferees. The paper mills are sources of organic suspended solids and oxygen-consuming materials.

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Heat and inert suspended solids are the major constituents of the wastewater from the electric generating stations.

The steel mills have installed facilities for the removal of inert suspended solids in the form of clarifiers and scale-pits. However, additional facilities or improved performance is required at several of these locations. Some improvements have been made by the use of coagulant aids.

At two installations, deep bed filters are presently under construction which will remove oil as well as suspended solids. All concentrated spent pickling liquors are hauled away for neutralization and disposal. Where chrome plating is carried out, treatment is provided for the acid and the chrome-bearing rinsewaters.

One paper mill has so far provided facilities for the pretreatment and discharge of 90 percent of its wastes to a municipal waste treatment plant, and it is expected that all of its wastes will be tributary to these facilities next year. The second paper mill provides for clarifications of its wastewater and the reuse of a portion thereof back in the plant. Plans are in preparation for further recycling and secondary treatment of the wastes now discharged.

I will add here that the secondary treatment will

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probably be provided by the municipal waste treatment facilities when installed.

Lagoons are provided at each of the electric generating stations for the disposal of bottom and fly ash. At the newer plants, blowdown waters, as well as water treatment sludges and backwash waters, are also diverted to these lagoons. Plans are now under way to extend this practice to the older stations.

Heated Water Discharge

At present no facilities are provided for the cooling of waters used for carrying away of large quantities of heat. An estimate of the maximum rate of heat discharged by Ohio electric generating stations may be made by applying the following factors to the capacity of the stations.

Heat Loss Rate - BTU/Megawatt-sec.

Old Plants	1500 - 2000
New Plants	1150

Applying these factors to the net rated capacity gives the following estimated maximum heat rejection rates for the listed stations.

<u>Station</u>	<u>Net Rated Capacity</u>	<u>Heat Rejection Rate BTU's/sec.</u>	<u>AT Degrees at Critical Flow</u>
Toronto	171	342,000	0.8
Tidd	312	624,000	1.5
Cardinal*	1180	1,350,000	3.4
Sammis*	2300	2,650,000	6.5

* - New Plants

I think the crucial or significant part of this is where it is shown that at the Toronto station the rise in stream temperature at low flow conditions is about 0.8 degree, at the Tidd plant 1.5 degrees, at Cardinal 3.4 degrees, and at Sammis plant 6.5 degrees. Incidentally, this plant is outside of the conference area. However, the effect is seen in the area. It has a rise of 6.5 degrees. This is the only one that is outside of the ORSANCO effluent criteria.

These were all calculated at a minimum river flow of 6,500 cubic feet per second.

The above calculations are admittedly for extreme conditions which in all probability will not occur. On an hourly basis, values in the range of 80 percent of those shown are more likely, and on a 24-hour basis values of 60 to 70 percent of those shown are more probable.

There are 10 industrial wastewater discharges to

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the minor Ohio tributaries in the conference area. Six of these are coal washing operations, two are railroad refueling facilities, another is a meat packing plant, and the tenth one is a chemical plant. At present the wastewaters of the last industry, the chemical plant, consist only of the effluent from a secondary sewage treatment plant. Each of the coal washers discharges its washwaters to a settling pond, and the effluent is reused.

Often water is added to the system so as to increase the moisture content of the coal to desirable levels. Oil separators have been provided by two railroad facilities and secondary treatment is in use at a meat packing plant.

There are a number of active coal strip mining and one deep mining operations in the drainage area of the tributaries. The principal source of acid mine drainage is from the refuse piles of abandoned deep mining operations. However, only in McMahon Creek is the acidity greater than the buffering capacity of the receiving stream.

I will add this. This does not say that these streams are not badly affected by iron and sulfates.

Current Water Quality

Data on the bacteriological quality of the Ohio River at the waterworks of Steubenville from January 1970

through July 1971, along with the results of analyses for metals on the finished water, is given in Table 5 (Appendix B). It will be noted that each of the monthly averages exceeded 1,000 total coliforms per 100 ml and for eight of the 19 months the average exceeded 5,000 per 100 ml. It is believed these figures are low due in part to the fact that the samples are taken from the raw water storage reservoir and not directly from the river.

Monthly minimum values for pH of the raw water ranged from 6.1 to 6.5.

The finished water based on analyses of five samples was found to be free of barium, cadmium, copper, iron, lead, nickel, and silver. Zinc was found in the range of 0.120 to 0.870 mg/l. One sample was found to contain 0.02 mg/l of manganese. I should say all of these are within the drinking water standards.

Recently lead was found to be present in one sample. However, on resampling none was detected.

Data on the water quality of the major tributaries is given in Table 6 (Appendix B). It will be noted that the minimum pH value for Cross, Short, and Wheeling Creeks ranged from 6.6 to 7.3, whereas in McMahon Creek it has reached a low of 4.6.

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Water Quality Standards

Water quality standards for the Ohio River were adopted by the Ohio Water Pollution Control Board on June 13, 1967. These standards called for water suitable for all uses in the Ohio River. The implementation schedules for the conference area along with the criteria are given in detail in Appendix C and may be summarized as follows:

Municipal Wastewaters

1. All sewage effluents will be continuously and satisfactorily disinfected, and the facilities to provide such disinfection will be installed without delay.

2. Additional facilities to provide secondary treatment shall be provided in accordance with the following schedules for completion. And this is subject to further comment.

- A. Report and General Plan - January 1, 1973
- B. Detail Plans - July 1, 1975
- C. Construction - January 1, 1977

Industrial Wastewaters

Adequate treatment or control, including secondary treatment of organic industrial waste, shall be provided according to the following schedules for completion:

- A. Detail Plans - July 1, 1968
- B. Construction -December 31, 1969

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I might say that these facilities required here were those that were designed to meet the water quality standards for the river. And that is river water quality, not effluent.

Amendments to the original standards for the Ohio River upgrading the criteria for aquatic life were adopted by the Ohio Water Pollution Control Board on April 14, 1970. Additional amendments to the criteria for public water supply, industrial water supply, aquatic life, and recreational uses were recommended to the Board by the staff of the Division of Engineering on September 29, 1971. The proposed revised criteria are included in Appendix D. These criteria differ from those shown in Table 1, page 17 of the EPA report as follows:

<u>Toxic Substances</u>	<u>Proposed 1/10 96 hr. TL_m</u>
Mercury mg/l	0.005
Dissolved Solids	
Monthly average mg/l	500
Daily maximum mg/l	750

Compliance With and Enforcement of
Water Quality Standards

Municipal

All permits issued by the Ohio Water Pollution

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Control Board to the municipalities in the conference area since the adoption of water quality standards for the Ohio River have included as a condition for renewal the requirement to initiate the preparation of a report and general plan for the installation of secondary treatment facilities. In addition, where necessary, the permits have called for studies for the abatement of pollution from combined sewer overflows and the adoption of programs for the reduction of stormwaters in sanitary inland sewers.

Industrial

Similarly, all permits issued to industries in the conference area contained conditions calling for the installation of the necessary facilities to meet adopted water quality standards in accordance with the schedules of the implementation plan.

By a review of Table 3, it will be noted that six industries have not completed their program as originally scheduled. One steel industry just completed its facilities on October 1, some 90 days after the scheduled completion dates. Two other steel industries have facilities under construction with completion schedules of December 1972. These measures are being installed in accordance with findings and orders of the Ohio Water Pollution Control Board after a show cause hearing late

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last year. A chemical plant is also scheduled to complete its facilities by December 1972. Plans are in preparation for the one paper mill requiring secondary treatment.

There is one omission from our schedule here, and this is the Yorkville plant of Wheeling Steel which requires some additional facilities for oil removal, and a study has been started on this.

Pollution Abatement on Minor Tributaries

Although water quality standards have not been adopted for the southeast Ohio tributaries of the Ohio River, pollution abatement programs are required through the permit system of the Ohio Water Pollution Control Board. The treatment requirements for municipal and industrial wastewater discharges to the streams in this area are equivalent to that for similar sized streams for which standards have been adopted.

Current programs call for the addition of secondary treatment to existing primary facilities, improvements to existing secondary treatment facilities, and providing secondary treatment in those places where no organized treatment facilities are provided.

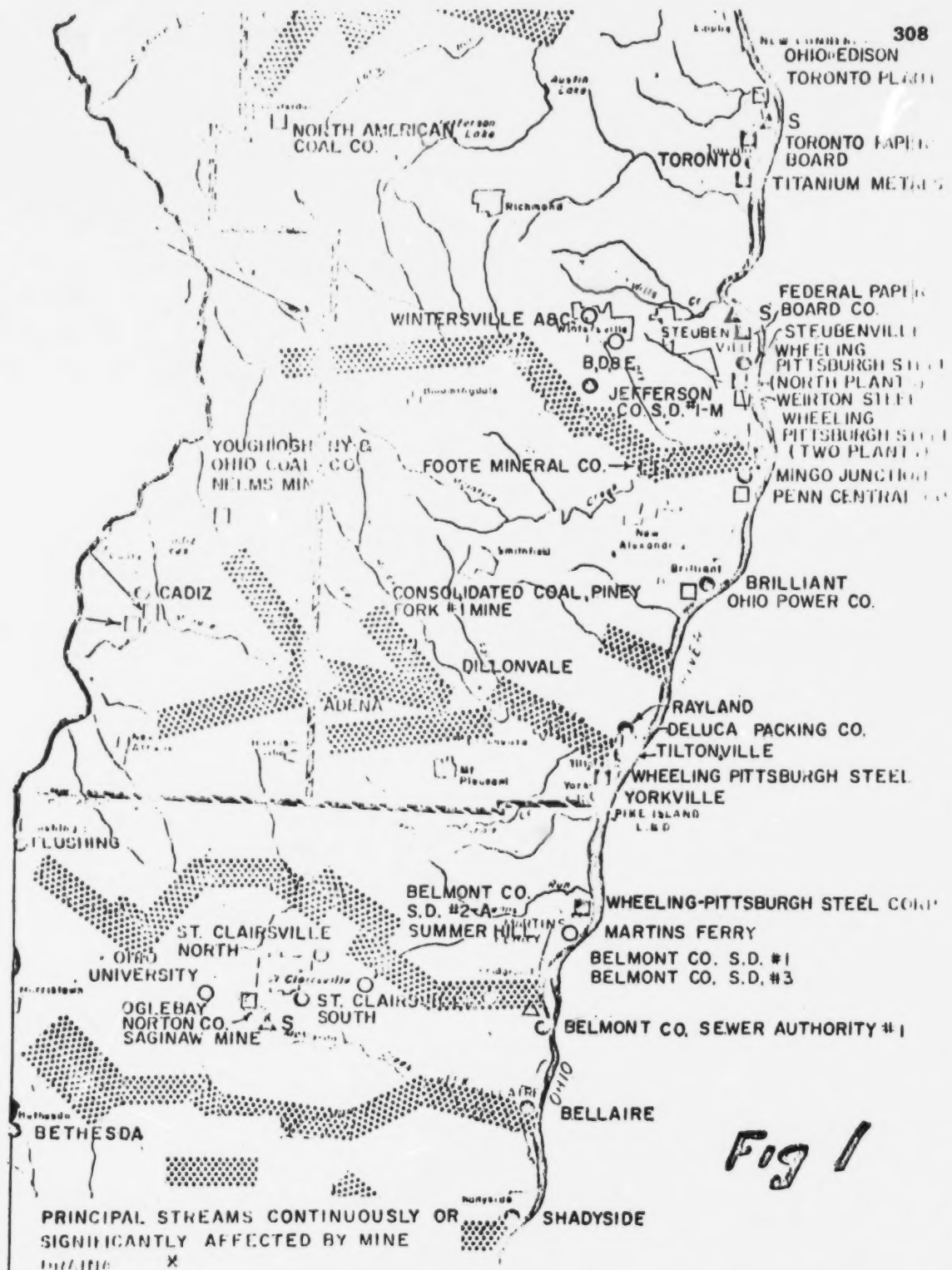
Improvements in the industrial waste treatment facilities are currently being required at a meat packing plant and two railroad refueling facilities.

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There is a definite need for improving the quality of the tributary streams in this area which have been degraded by acid mine drainage from abandoned mining operations. Ohio would like to join with the other States and the Federal Government in developing a consistent overall program for dealing with this problem.

(The appendices to Mr. Richards' statement follow.)

APPENDIX A



APPENDIX B

TABLE 1. DATA ON MUNICIPAL WASTEWATER CONTROL FACILITIES
OHIO RIVER (MAIN STEM)

PLACE AND YEAR FACILITIES BUILT	MILE POINT	TYPE-SEWER SYST. TYPE-TREAT. FAC. DESIGN PE	1970 U.S. CENSUS AVG. FLOW MGD	WASTE LOADS & % REMOVAL SUSPENDED SOLIDS - PE BIO. OXYGEN DEMAND PE		TREATMENT REQUIREMENTS AND REMARKS
				RAW	FINAL %	
WELLSVILLE	47.6	S - PRIM. - D 8,500	5.891 0.269	876 1,780	518 1,215	31 31 SECONDARY TREATMENT
STRATTON	54.9	S - PRIM. - D 1,000	386 0.037	ND 565	ND	NO SECONDARY TREATMENT
TORONTO 1961	59.0	C - PRIM. - D 10,000	7,735 0.610	2,872 8,200	694 4,220	70 49 SECONDARY TREATMENT
STUEBENVILLE 1956	68.0	S - C - INTER. - D 65,000	20,771 3.233	14,150 16,650	6,240 9,900	55 41 SECONDARY TREATMENT
MINGO JUNCTION 1960	71.0	S - C - PRIM. + D 9,000	5,726 0.207	1,100 1,450	565 935	58 33 SECONDARY TREATMENT
BRIGHT 1959	74.5	S - PRIM. - D 4,000	2,178 0.138	834 1,650	352 575	61 63 SECONDARY TREATMENT
RAYLAND	82.0	S - PRIM. - D 1,000	617 0.020	ND 219	ND 103	- 50 SECONDARY TREATMENT
TILTONVILLE 1959	83.0	S - PRIM. - D 3,500	2,123 0.125	ND 1,450	ND 630	ND 55 SECONDARY TREATMENT
BELMONT COUNTY S.D. #1	92.0	S - PRIM. - D 5,000	ND 0.240	1,855 1,920	990 1,540	47 20 SECONDARY TREATMENT
*BELMONT COUNTY SEWER AUTHORITY #1 1964	94.0	S - C - PRIM. - D 40,000	24,352 3.02	ND 20,800	ND 12,700	ND 39 SECONDARY TREATMENT
SHADYSIDE 1956	96.9	S - PRIM. - D 6,000	5,071 0.282	2,960 3,920	1,090 2,420	63 38 SECONDARY TREATMENT

*Includes Bellaire, Bridgeport, Brookside, and Martins Ferry
ND - No Data

TABLE 2. DATA ON MUNICIPAL WASTEWATER CONTROL FACILITIES
MINOR TRIBUTARIES OF OHIO RIVER
TORONTO TO SHADYSIDE

PLACE AND YEAR FACILITIES BUILT	RECEIVING STREAM	TYPE-SEWER SYST. TYPE-TREAT. FAC. DESIGN PE	1970 U.S. CENSUS AVE. FLOW MGD	WASTE LOADS + % REMOVAL		TREATMENT REQUIREMENTS AND RETURNS
				SUSPENDED SOLIDS - PE RAW	BIO. OXYGEN DEMAND PE FINAL	
WINTERSVILLE (5 plants) 1967	CROSS CREEK	S - SEC. - D 3,100	4,921 0.170	6,900 2,150	75 137	98 94
CADIZ	TRIB. TO SHORT CREEK	S - SEC. - D 4,000	2,600 0.942	ND 4,620	ND 1,740	- 62
ADENA	SHORT CREEK	NONE	1,134			
DILLONVALE 1939	SHORT CREEK	S - PRIM. 1,400	1,095 0.084	ND ND	ND ND	
FLUSHING 1939	WHEELING CREEK	S - SEC. - D 1,600	1,207 0.155	ND 1,610	ND 490	ND 70
ST. CLAIRSVILLE NORTH PLANT 1937-67	TOWN RUN WHEELING CREEK	S - SEC. - D 2,000	4,754 0.244	1,700 2,380	371 723	71 70
BELMONT COUNTY S.D. #1 1966	WHEELING CREEK	S - PRIM. - D 5,000	ND 0.151	790 1,080	550 1,080	31 0
BELMONT COUNTY HILLENDALE S th DIVISION 1967	TRIB. TO WHEELING CREEK	S - SEC. - D 300	ND ND	ND ND	ND ND	ND ND

*See appended letter at end of transcript.

TABLE 2. - continued

PLACE AND YEAR FACILITIES BUILT	RECEIVING STREAM	TYPE-SEWER SYST. TYPE-TREAT. FAC. DESIGN PE	1970 U.S. CENSUS AVG. FLOW MGD	WASTE LOADS + REMOVAL			TREATMENT REQUIREMENTS AND REMARKS
				SUSPENDED SOLIDS - PE BIO. OXYGEN DEMAND PE RAW	FINAL	%	
ST. CLAIRSVILLE SOUTH PLANT 1940-67	AULTS RUN McMILLON CREEK	S - SEC. - D 2,000	4.754 0.241	1,430 2,360	260 612	80 74	
YORKVILLE 1958	DEEP RUN	S - PRIM. - D 3,600	1.656 0.239	2,970 3,500	1,200 1,765	50 50	
OHIO UNIVERSITY BELMONT COUNTY BRANCH	MINOR TRIBUTARY	S - SEC. - D 400	ND ND	ND ND	ND ND	ND ND	
BELMONT COUNTY S.D. #1 SUBDIVISION H	MINOR TRIBUTARY	S - SEC. - D	ND ND	ND ND	ND ND	ND ND	RECENTLY COMPLETED

TABLE 3. INDUSTRIAL WASTEWATER POLLUTION CONTROL FACILITIES
 ONTARIO RIVER - MAIN STEM
 TORONTO-SHADESIDE

PLANT NAME	LOCATION	MILE PT.	TYPE OF INDUSTRY	CRITICAL CONSTITUENTS	TREATMENT PROVIDED	REMARKS
OHIO EDISON CO. SANDS PLANT	JEFFERSON CO. SALINE TWP.	55.9	POWER	SUSPENDED SOLIDS, HEAT	DRY FLY ASH COLL. BOTTOM ASH & BLOW DOWN TO LAGOONS	NONE
TORONTO PAPERBOARD CO.	TORONTO	59.1	PAPER MILL	SUSPENDED SOLIDS, OXYGEN DEMAND	IN-PLANT CONTROLS RECYCLING, SETTLING	SECONDARY TREATMENT 7/77
OHIO EDISON CO. TORONTO PLANT	JEFFERSON CO. KNOX TWP.	60.0	POWER	SUSPENDED SOLIDS, HEAT	LAGOONS	
TITANIUM METALS CORP. OF AMERICA	TORONTO	60.0	NON-FERROUS METAL	SUSPENDED SOLIDS, ALKALIES	IN-PLANT CONTROLS	pH ADJUSTMENT 12/72
FEDERAL PAPER BOARD CO., INC.	STEUBENVILLE	67.3	PAPER MILL	SUSPENDED SOLIDS, OXYGEN DEMAND	90% OF FLOW DISCHARGED TO CITY SEWERS	ADD CONNECTION TO MUNICIPAL SEWER. UNDER CONSTRUCTION.
WEIRTON STEEL CO. DIV. OF NATIONAL STEEL CORP.	STEUBENVILLE	68.6	PLATING	ACIDS, CHROMIUM	OFF-SITE NEUTRALIZATION & DISPOSAL. TREATMENT OF RINSE WATERS.	NONE
PITTSBURGH-WHEELING STEEL CORPORATION NORTH PLANT	STEUBENVILLE	68.6	BLAST FURNACE	SETTLABLE SOLIDS, IRON	CHEMICAL TREATMENT, SETTLING, SLUDGE DEWATERING	NONE
NORTH PLANT	STEUBENVILLE	68.6	ROLLING MILL	SETTLABLE SOLIDS, IRON, OILS	SETTLING-RECYCLING	ADD. SOLIDS AND OIL REMOVAL. DEEP BED FILTER. UNDER CONSTRUCTION. 12/72

TABLE 3. - continued

PLANT NAME	LOCATION	MILE PT.	TYPE OF INDUSTRY	CRITICAL CONSTITUENTS	TREATMENT PROVIDED	REQUIREMENTS AND/OR REMARKS*
PITTSBURGH-WHEELING STEEL CORP. - con't. NORTH PLANT	STUEBENVILLE	68.6	PICKLING	ACIDS, IRON	OFF-SITE NEUTRALIZATION AND DISPOSAL	NONE
SOUTH PLANT	MINGO JUNCTION	71.0	BLAST FURNACE	SETTLABLE SOLIDS	SETTLING, SLUDGE Dewatering	NONE
SOUTH PLANT	MINGO JUNCTION	71.0	ROLLING MILL	SETTLABLE SOLIDS	SETTLING-PELVOLING	ADDITIONAL SOLIDS PRODUCTION, DEEP BED FILTER UNDER CONSTRUCTION, 12/72
PENNSYLVANIA RAILROAD COMPANY	MINGO JUNCTION	71.0	R.R. REFUELING	OIL	OIL SEPARATOR	NONE
OHIO COMPANY COMPANY 1100 PLANT	BRILLIANT	75.0	POWER	SETTLABLE SOLIDS, HEAT	LAGOONS	NONE
CARDINAL PLANT	BRILLIANT	75.0	POWER	SETTLABLE SOLIDS, HEAT	LAGOONS	NONE
WHEELING STEEL CORP. YORKVILLE PLANT	YORKVILLE	83.7	STEEL-MISC. (TIN PLATE)	ACID, IRON, OIL, DISSOLVED SOLIDS	OFF-SITE DISPOSAL UNDERWAY	ADDITIONAL STUDIES
MARTINS FERRY PLANT	MARTINS FERRY	88.8	STEEL-MISC.	ACID, ZINC	CONTROLLED DISCHARGE	ACID NEUTRALIZATION AND ZINC REMOVAL FACILITIES 7/71. COMPLETED 10/1/71.

*DATE ESTABLISHED BY WATER QUALITY STANDARDS OR ORDERS OF THE OHIO WATER POLLUTION CONTROL BOARD

TABLE 4. DATA ON INDUSTRIAL WASTEWATER CONTROL FACILITIES
MINOR TRIBUTARIES OF OHIO RIVER
TORONTO TO SHADYSIDE

PLANT NAME	LOCATION	TYPE OF INDUSTRY	RECEIVING STREAM	CRITICAL CONSTITUENTS	TREATMENT PROVIDED	REQUIREMENTS AND REMARKS
DELUCA PACKING CO.	JEFFERSON CO. WARREN TWP.	FOOD PROCESSING (MEAT)	TRIB. OF CONNORVILLE CRK. SHORT CREEK	SUSPENDED SOLIDS, BOD	SEPTIC TANK, SAND FILTER, LEACH WELLS	REHABILITATION OF FACILITIES
FOOTE MINERAL CO. METALLURGICAL PRODUCTS DIV.	JEFFERSON CO. CROSS CREEK TWP.	METAL ALLOYS	CROSS CREEK	SAINTIARY SEWAGE ONLY	SECONDARY TREATMENT	NONE
HANNA COAL CO. GEORGETOWN PLANT	HARRISON CO. CADIZ TWP.	COAL WASHING	SHORT CREEK	SUSPENDED SOLIDS	SETTLING PONDS • REUSE	NONE- NO DISCHARGE
HANNA COAL CO. PINEY FORK #1 MINE	JEFFERSON CO. SMITHFIELD TWP.	COAL WASHING	PINEY FORK CREEK SHORT CREEK	SUSPENDED SOLIDS	SETTLING PONDS • REUSE	NONE- NO DISCHARGE
NORTH AMERICAN COAL CO. POWATTAN #3 MINE	BELMONT CO. MEAD TWP.	COAL WASHING	UNNAMED TRIB. OF OHIO RIVER	SUSPENDED SOLIDS	SETTLING PONDS • REUSE	NONE- NO DISCHARGE
NORTH AMERICAN COAL CO. JENSIE MINE	JEFFERSON CO. SPRINGFIELD TWP.	COAL WASHING	WOLF CREEK YELLOW CREEK	SUSPENDED SOLIDS	SETTLING PONDS • REUSE	NONE- NO DISCHARGE
OGLEBAY MORTON CO. SAGINAW MINE	BELMONT CO. WASHINGTON TWP.	COAL WASHING	L. McMAHON CRK. McMAHON CRK.	SUSPENDED SOLIDS	SETTLING PONDS • REUSE	NONE- NO DISCHARGE
PENN-CENTRAL TRANSPORTATION CO. GEORGETOWN FUELING FACILITY	HARRISON CO. CADIZ TWP.	RAILROAD	TRIB. OF MIDDLE FORK SHORT CREEK	OILS	OIL SEPARATOR	IMPROVEMENTS
PENN-CENTRAL TRANSPORTATION CO.	JEFFERSON CO. STEUBENVILLE TWP.	RAILROAD	INDIAN CROSS CRK. GEORGES RUN	OILS	OIL SEPARATOR	IMPROVEMENTS
THE YOUNGSHIRE & OHIO COAL CO. NELMS MINE	HARRISON CO. GREEN TWP.	COAL WASHING	NORTH FORK, SHORT CRK.	SUSPENDED SOLIDS	SETTLING PONDS • REUSE	NONE- NO DISCHARGE

TABLE 5. ANALYSIS OF OHIO RIVER
STEUBENVILLE WATER TREATMENT PLANT (1)
1970 - 1971

A. RAW WATER

MONTH	MONTHLY AVERAGES		TOTAL COLIFORMS		NUMBER OF DAYS EXCEEDING 20,000/100ml	
	1970	1971	1970	1971	1970	1971
January	5,700	4,200	1	0	1	0
February	5,500	15,400	1	3	1	3
March	2,900	5,600	0	1	0	1
April	5,000	2,400	1	0	1	0
May	3,900	3,500	0	0	0	0
June	2,700	1,300	0	0	0	0
July	8,100	2,900	4	0	4	0
August	2,100	---	0	---	0	---
September	6,100	---	1	---	1	---
October	3,900	---	0	---	0	---
November	25,600	---	8	---	8	---
December	27,000	---	10	---	10	---

PH VALUES
DAILY MINIMUM AND MAXIMUM

	1970	1971
January - March	6.2 - 6.7	6.1 - 6.5
April - June	6.1 - 7.1	6.2 - 7.0
July - September	6.1 - 6.9	
October - December	6.2 - 7.2	

B. FINISHED WATERS

METALS

Zinc	0.120 - 0.870
Mn	0.00 - 0.02
Not detected Ba, Cd, Cr, Cu, Fe, Pb, Ni, Ag.	

(1) Raw Water Storage Reservoir

TABLE 6. DATA ON WATER QUALITY OF CROSS CREEK, SHORT CREEK,
WHEELING CREEK and McMAHON CREEK

NO. OF SAMPLES	PH	ACIDITY mg/l	ALKALINITY mg/l	HARDNESS mg/l	SULFATE mg/l	TOTAL	MANGANESE mg/l	ALUMINUM mg/l	FLOW cfs
						IRON mg/l			
<u>CROSS CREEK</u>									
MIN.	6.7	0.0	66.0	50.0	300.0	0.0	0.3	0.0	9.0
MAX.	7.5	22.0	82.0	1005.0	850.0	2.4	2.4	8.1	24.7
AVG.	6	6.5	73.0	820.3	510.8	0.7	1.0	2.0	15.1
<u>SHORT CREEK</u>									
MIN.	6.6	0.0	110.0	920.0	300.0	1.1	0.0	4.0	24.0
MAX.	7.5	15.0	145.0	2560.0	1750.0	16.8	3.3	16.2	131.0
AVG.	6	5.0	127.2	1475.7	698.3	6.7	1.2	10.0	89.7
<u>WHEELING CREEK</u>									
MIN.	7.3	0.0	82.0	366.0	345.0	2.4	0.2	0.0	14.0
MAX.	8.0	11.0	147.0	1363.0	950.0	7.2	1.1	21.8	29.0
AVG.	6	2.0	121.5	1001.8	460.0	3.4	0.4	8.3	22.4
<u>McMAHON CREEK</u>									
MIN.	4.6	0.0	0.0	730.0	15.0	0.6	1.0	0.0	3.8
MAX.	6.6	125.0	17.0	1031.0	450.0	9.6	2.0	24.6	9.0
AVG.	6	73.2	8.0	877.8	296.7	4.6	1.5	11.0	7.1

APPENDIX C

WATER POLLUTION CONTROL BOARD
DEPARTMENT OF HEALTH
COLUMBUS, OHIO

WATER QUALITY STANDARDS ADOPTED BY THE BOARD JUNE 13, 1967,
FOR THE INTERSTATE WATERS OF THE OHIO RIVER OF
OHIO-WEST VIRGINIA AND OHIO-KENTUCKY

The Ohio Water Pollution Control Board hereby adopts the following water quality standards for the interstate waters of the Ohio River of Ohio-West Virginia and Ohio-Kentucky:

MINIMUM CONDITIONS APPLICABLE TO
ALL WATERS AT ALL PLACES AND AT ALL TIMES

- (1) Free from substances attributable to municipal, industrial, or other discharges, or agricultural practices that will settle to form putrescent or otherwise objectionable sludge deposits;
- (2) Free from floating debris, oil, scum, and other floating materials attributable to municipal, industrial, or other discharges, or agricultural practices in amounts sufficient to be unsightly or deleterious;
- (3) Free from materials attributable to municipal, industrial, or other discharges, or agricultural practices producing color, odor, or other conditions in such degree as to create a nuisance;
- (4) Free from substances attributable to municipal, industrial, or other discharges, or agricultural practices in concentrations or combinations which are toxic or harmful to human, animal, plant, or aquatic life.

STREAM-QUALITY CRITERIA

For Public Water Supply and Food Processing Industry

The following criteria are for evaluation of stream quality at the point at which water is withdrawn for treatment and distribution as a potable supply:

- (1) Bacteria: Coliform group not to exceed 5,000 per 100 ml as a monthly average value (either MPN or MF count); nor exceed this number in more than 20 percent of the samples examined during any month; nor exceed 20,000 per 100 ml in more than five percent of such samples;

- (2) Threshold-odor Number: Not to exceed 24 (at 60 deg. C.) as a daily average;
- (3) Dissolved solids: Not to exceed 500 mg/l as a monthly average value, nor exceed 750 mg/l at any time. For Ohio River water, values of specific conductance of 800 and 1,200 micromhos/cm (at 25 deg. C.) may be considered equivalent to dissolved-solids concentrations of 500 and 750 mg/l.
- (4) Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l), nor shall activity from dissolved Strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
- (5) Chemical constituents: Not to exceed the following specified concentrations at any time:

<u>Constituent</u>	<u>Concentration (mg/l)</u>
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium (hexavalent)	0.05
Cyanide	0.025
Fluoride	1.0
Lead	0.05
Selenium	0.01
Silver	0.05

For Industrial Water Supply

The following criteria are applicable to stream water at the point at which the water is withdrawn for use (either with or without treatment) for industrial cooling and processing:

- (1) Dissolved oxygen: Not less than 2.0 mg/l as a daily-average value, nor less than 1.0 mg/l at any time.
- (2) pH: Not less than 5.0 nor greater than 9.0 at any time.
- (3) Temperature: Not to exceed 95 deg. F. at any time.
- (4) Dissolved solids: Not to exceed 750 mg/l as a monthly average value, nor exceed 1,000 mg/l at any time. For Ohio River water, values of specific conductance of 1,200 and 1,600 micromhos/cm (at 25 deg. C.) may be considered equivalent to dissolved-solids concentrations of 750 and 1,000 mg/l.

For Aquatic Life

The following criteria are for evaluation of conditions for the maintenance of a well-balanced, warm-water fish population. They are applicable at any point in the stream except for areas immediately adjacent to outfalls. In such areas cognizance will be given to opportunities for the admixture of waste effluents with river water:

- (1) Dissolved oxygen: Not less than 5.0 mg/l during at least 16 hours of any 24-hour period, nor less than 3.0 mg/l at any time.
- (2) pH: No values below 5.0 nor above 9.0, and daily average (or median) values preferably between 6.5 and 8.5.
- (3) Temperature: Not to exceed 93 deg. F. at any time during the months of May through November, and not to exceed 73 deg. F. at any time during the months of December through April.
- (4) Toxic substances: Not to exceed one-tenth of the 48-hour median tolerance limit, except that other limiting concentrations may be used in specific cases when justified on the basis of available evidence and approved by the appropriate regulatory agency.

For Recreation

The following criterion is for evaluation of conditions at any point in waters designated to be used for recreational purposes, including such water-contact activities as swimming and water skiing:

Bacteria: Coliform group not to exceed 1,000 per 100 ml as a monthly average value (either MPN or MF count); nor exceed this number in more than 20 percent of the samples examined during any month; nor exceed 2,400 per 100 ml (MPN or MF count) on any day.

For Agricultural Use and Stock Watering

The following criteria are applicable for the evaluation of stream quality at places where water is withdrawn for agricultural use or stock-watering purposes:

- (1) Free from substances attributable to municipal, industrial, or other discharges, or agricultural practices that will settle to form putrescent or otherwise objectionable sludge deposits:
- (2) Free from floating debris, oil, scum, and other floating materials attributable to municipal, industrial, or other discharges, or agricultural practices in amounts sufficient to be unsightly or deleterious;

- (3) Free from materials attributable to municipal, industrial, or other discharges, or agricultural practices producing color, odor, or other conditions in such degree as to create a nuisance;
- (4) Free from substances attributable to municipal, industrial, or other discharges, or agricultural practices in concentrations or combinations which are toxic or harmful to human, animal, plant, or aquatic life.

The Stream-Water Quality for the Ohio River will meet all the conditions and will meet the criteria for the uses at places as specified in the foregoing.

IMPLEMENTATION AND ENFORCEMENT PLAN

The Ohio Water Pollution Control Board, under the provisions of Sections 6111.01 to 6111.03, 6111.31 to 6111.38, and 6111.99, Ohio Revised Code, has authority to control, prevent, and abate pollution in the waters of this state. In accordance with such authority, the Board hereby adopts the following program and requirements for the prevention, control, and abatement of new or existing pollution of the waters of the state considered herein:

- (1) The critical or minimum flows in the Ohio River are those that may be expected during a seven day period once in ten years based on flow augmentation from all reservoirs that will be in operation by 1970; these flows were estimated by the U.S. Corps of Engineers and the Ohio River Valley Water Sanitation Commission;
- (2) All plans and proposals for abatement or correction of pollution will be approved by the Ohio Department of Health as required by law and such approvals shall constitute approval by the Board;
- (3) All sewage and organic industrial wastes will be given secondary treatment (biochemical oxidation), and the facilities to provide such treatment will be constructed and placed in operation without delay, and in no instance later than the dates specified in the attached schedules;
- (4) All other pollution constituents will be adequately treated to meet the stream-water quality conditions and criteria, and the facilities to provide such treatment will be placed in operation without delay, and in no instance later than the dates specified in the attached schedules;
- (5) All sewage effluents will be continuously and satisfactorily disinfected and the facilities to provide such disinfection will be installed without delay;

- (6) Local programs will be initiated to control and reduce pollution resulting from (a) bypassing, (b) spillages, and (c) discharges resulting from construction or breakdowns:
- (7) Necessary studies will be made and, where feasible, plans and construction programs will be developed as rapidly as possible for reducing pollution from existing combined sewer overflows:
- (8) Continue the studies in the Markland Pool stretch of the river to determine the supplementary treatment that may be needed to meet the criteria for a well balanced warm-water fish population and water-contact recreation, and provide such treatment to the fullest extent consistent with current research and technological advances; and,
- (9) Continue the Ohio portion of the stream-water quality monitoring network described in the 1966 Annual Report of the Ohio River Valley Water Sanitation Commission.

Enforcement of these requirements will be carried out by means of the respective permits issued to municipalities, counties, industries, and other entities discharging to the waters considered herein, and failure to comply with the permit conditions will result in legal action in accordance with the provisions of law.

APPENDIX D

WATER POLLUTION CONTROL BOARD
OHIO DEPARTMENT OF HEALTH
COLUMBUS, OHIO

RESOLUTION ESTABLISHING AMENDED CRITERIA OF STREAM-WATER QUALITY
FOR VARIOUS USES ADOPTED BY THE BOARD ON APRIL 14, 1970

WHEREAS,--Section 6111.03, of the Ohio Revised Code, provides, in part, as follows:

"The water pollution control board shall have power:

(A)--To develop programs for the prevention, control and abatement of new or existing pollution of the waters of the state; ---" and

WHEREAS,--Primary indicators of stream-water quality are needed as guides for appraising the suitability of surface waters in Ohio for various uses; and

WHEREAS,--The stream-water quality criteria for various uses and minimum conditions applicable to all waters adopted by the Board of June 14, 1966, have been amended by the Ohio River Valley Water Sanitation Commission; and

WHEREAS,--The criteria adopted by the Board on October 10, 1967, have been further amended by the Ohio River Valley Water Sanitation Commission;

THEREFORE BE IT RESOLVED, That the following amended stream-water quality criteria for various uses, and minimum conditions applicable to all waters, and policies for protection of high quality waters and for water quality design flow, are hereby adopted in accordance with amendments of the Ohio River Valley Water Sanitation Commission, and the recommendations of the Federal Water Pollution Control Administration:

AND BE IT FURTHER RESOLVED, That the THE FOLLOWING amended stream-water quality criteria for various uses, for minimum conditions, for protection of high quality waters, and, for water quality design flow, ARE HEREBY ADOPTED AND be made applicable to the following waters of the state:

1. Maumee, Tiffin, St. Joseph, and St. Marys River Basins;
2. --Lake Erie & Interstate Waters thereof;
2. MAHONING RIVER, LITTLE BEAVER CREEK, PYMATUNING CREEK AND YANKEE CREEK BASINS;
3. Great Miami, Whitewater, and Wabash River Basins;
4. Ashtabula River, Conneaut and Turkey Creeks;
5. Ohio River of Ohio-West Virginia and Ohio-Kentucky;
6. North Central Ohio Tributaries of Lake Erie;
7. Scioto River Basin;
8. Little Miami River Basin;
9. Rocky, Cuyahoga, Chagrin, and Grand River Basins;
10. Muskingum River Basin;
11. Hocking River Basin.

MINIMUM CONDITIONS APPLICABLE TO
ALL WATERS AT ALL PLACES AND AT ALL TIMES

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1. Free from substances attributable to municipal, industrial or other discharges, or agricultural practices that will settle to form putrescent or otherwise objectionable sludge deposits.
2. Free from floating debris, oil, scum and other floating materials attributable to municipal, industrial or other discharges, or agricultural practices in amounts sufficient to be unsightly or deleterious.
3. Free from materials attributable to municipal, industrial or other discharges, or agricultural practices producing color, odor or other conditions in such degree as to create a nuisance.
4. Free from substances attributable to municipal, industrial or other discharges, or agricultural practices in concentrations or combinations which are toxic or harmful to human, animal, plant or aquatic life.

PROTECTION OF HIGH QUALITY WATERS

Waters whose existing quality is better than the established standards as of the date on which such standards become effective will be maintained at their existing high quality, pursuant to the Ohio water pollution control statutes, so as not to interfere with or become injurious to any assigned uses made of, or presently possible, in such waters. This will require that any industrial, public or private project or development which would constitute a new source of pollution or an increased source of pollution to high quality waters will be required, as part of the initial project design, to provide the most effective waste treatment available under existing technology. The Ohio Water Pollution Control Board will cooperate with other agencies of the state, agencies of other states, interstate agencies and the Federal Government in the enforcement of this policy.

WATER QUALITY DESIGN FLOW

Where applicable for the determination of treatment requirements the water quality design flow shall be the minimum seven consecutive day average that is exceeded in 90 percent of the years.

STREAM-QUALITY CRITERIA

FOR PUBLIC WATER SUPPLY

WATERS DESIGNATED AS A SOURCE OF PUBLIC WATER SUPPLY WILL BE OF SUCH QUALITY THAT FEDERAL-DRINKING WATER STANDARDS FOR FINISHED WATER CAN BE MET BY CONVENTIONAL TREATMENT WHICH INCLUDES COAGULATION, FILTRATION AND DISINFECTION.

The following criteria are for evaluation of stream quality at the point at which water is withdrawn for treatment and distribution as a potable supply:

1. Bacteria: Coliform group not to exceed 5,000 per 100 ml as a monthly average value (either MPN or MF count); nor exceed this number in more than 20 percent of the samples examined during any month; nor exceed 20,000 per 100 ml in more than five percent of such samples.
2. Threshold-odor number: Not to exceed 24 (at 60 deg. C.) as a daily average.
3. Dissolved solids: Not to exceed 500 mg/l as a monthly average value, nor exceed 750 mg/l at any time.
4. Radioactivity: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l), nor shall activity from dissolved strontium 90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l.
5. Chemical constituents: Not to exceed the following specified concentrations at any time.

<u>Constituent</u>	<u>Concentration (mg/l)</u>
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium (hexavalent)	0.05
Cyanide	0.025
Fluoride	1.0
Lead	0.05
Selenium	0.01
Silver	0.05
MERCURY	0.005

FOR INDUSTRIAL WATER SUPPLY

The following criteria are applicable to stream water at the point at which the water is withdrawn for use (either with or without treatment) for industrial cooling and processing:

1. ~~Dissolved oxygen: Not less than 2.0 mg/l as a daily average value, nor less than 1.0 mg/l at any time.~~

2. ~~pH: Not less than 5.0 nor greater than 9.0 at any time.~~

3. ~~Temperature: Not to exceed 95 deg. F. at any time.~~

4. Dissolved solids: Not to exceed 750-mg/l 500 MG/L as a monthly average value, nor exceed 1,000-mg/l 750 MG/L at any time.

FOR AQUATIC LIFE A

The following criteria are for evaluation of conditions for the maintenance of a well-balanced, warm-water fish population. They are applicable at any point in the stream except for areas necessary for the admixture of waste effluents with stream water:

1. Dissolved oxygen: Not less than an average of 5.0 mg/l per calendar day and not less than 4.0 mg/l at any time.

2. pH:

A. No values below 6.0 nor above 8.5.

B. Daily fluctuations which exceed the range of pH 6.0 to pH 8.5 and are correlated with photosynthetic activity may be tolerated.

3. Temperature:

A. No abnormal temperature changes that may affect aquatic life unless caused by natural conditions.

B. The normal daily and seasonal temperature fluctuations that existed before the addition of heat due to other than natural causes shall be maintained.

C. Maximum temperature rise at any time or place above natural temperatures shall not exceed 5 deg. F. In addition, the water temperature shall not exceed the maximum limits indicated in the following table.

WATERS	Maximum Temperature in Deg. F. During Month											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
All waters except												
Ohio River	50	50	60	70	80	90	90	90	90	78	70	57
Main Stem-Ohio River	50	50	60	70	80	87	89	89	87	78	70	57

4. Toxic substances: Not to exceed one-tenth of the 48-hour 96-HOUR median tolerance limit, except that other limiting concentrations may be used in specific cases when justified on the basis of available evidence and approved by the appropriate regulatory agency.

FOR AQUATIC LIFE-B-

The following criteria are for evaluation of conditions for the maintenance of desirable biological growths and, in limited stretches of a stream, for permitting the passage of fish through the water, except for areas necessary for admixture of effluents with stream water:

1. --- Dissolved oxygen: --Not less than 3.0 mg/l as a daily average value, nor less than 2.0 mg/l at any time.
2. --- pH: --Not less than 6.0 nor greater than 8.5 at any time.
3. --- Temperature: --Not to exceed 95 deg. F. at any time.
4. --- Toxic substances: --Not to exceed one-tenth of the 48-hour median tolerance limit, except that other limiting concentrations may be used in specific cases when justified on the basis of available evidence and approved by the appropriate regulatory agency.

FOR AQUATIC LIFE - COLD WATER FISHERIES

THE FOLLOWING CRITERIA ARE FOR EVALUATION OF CONDITIONS FOR THE MAINTENANCE OF AQUATIC LIFE - COLD WATER FISHERIES POPULATION. THEY ARE APPLICABLE AT ANY POINT IN THE STREAM EXCEPT FOR AREAS NECESSARY FOR THE ADMIXTURE OF SEWAGE EFFLUENTS WITH STREAM WATER:

1. DISSOLVED OXYGEN: NOT LESS THAN 6 MG/L AT ANY TIME AND NOT LESS THAN 7 MG/L AT ANY TIME IN SPAWNING AREAS.
2. PH: NO VALUES BELOW 6.5 NOR ABOVE 8.5
3. TEMPERATURE: NATURAL STREAM TEMPERATURES. NO HEAT TO BE ADDED.
4. TOXIC SUBSTANCES: NOT TO EXCEED ONE-TENTH OF THE 96-HOUR MEDIAN TOLERANCE LIMIT, EXCEPT THAT OTHER LIMITING CONCENTRATIONS MAY BE USED IN SPECIFIC CASES WHEN JUSTIFIED ON THE BASIS OF AVAILABLE EVIDENCE AND APPROVED BY THE APPROPRIATE REGULATORY AGENCY.

FOR RECREATION

The following criterion is for evaluation of conditions at any point in waters designated to be used for recreational purposes, including such water-contact activities as swimming and water-skiing.

PRIMARY CONTACT - (SWIMMING AND WATER-SKIING)

Bacteria: The fecal coliform content (either MPN or MF count) not to exceed 200 per 100 ML as a monthly geometric mean based on not less than five samples per month; nor exceed 400 per 100 ML in more than ten percent of all samples taken during a month.

SECONDARY CONTACT - (BOATING, FISHING AND WADING)

BACTERIA: THE FECAL COLIFORM CONTENT (EITHER MPN OR MF COUNT) NOT TO EXCEED 1,000 PER 100 ML AS A MONTHLY GEOMETRIC MEAN BASED ON NOT LESS THAN FIVE SAMPLES PER MONTH; NOR EXCEED 2,000 PER 100 ML IN MORE THAN TEN PERCENT OF ALL SAMPLES TAKEN DURING A MONTH.

FOR AGRICULTURAL USE AND STOCK WATERING

The following criteria are applicable for the evaluation of stream quality at places where water is withdrawn for agricultural use or stock-water purposes:

1. Free from substances attributable to municipal, industrial or other discharges, or agricultural practices that will settle to form putrescent or otherwise objectionable sludge deposits.
2. Free from floating debris, oil, scum and other floating materials attributable to municipal, industrial or other discharges, or agricultural practices in amounts sufficient to be unsightly or deleterious.
3. Free from materials attributable to municipal, industrial or other discharges, or agricultural practices producing color, odor or other conditions in such degree as to create a nuisance.
4. Free from substances attributable to municipal, industrial or other discharges or agricultural practices in concentrations or combinations which are toxic or harmful to human, animal, plant or aquatic life.

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MR. RICHARDS: This is in addition to what I have said. Although the schedules for the planning and construction of the secondary treatment facilities for municipalities in the section of the Ohio River under consideration were established by the Water Pollution Control Board subsequent to a hearing and the fixing of water quality criteria, I am sure that the Water Pollution Control Board will entertain a recommendation for a shortening of these schedules insofar as possible.

I might add that, with reference to the recommendation of EPA for a completion schedule of December 1974 for secondary treatment, this may be a little tight for certain communities which would require a little longer time than that for detailed plans and construction.

I would make the recommendation that this conference accept the schedules for additional corrective measures agreed to by ORSANCO and which have been furnished to the conference and that any amendments will be made to that schedule through normal procedure.

Thank you.

MR. STEIN: Thank you.

Are there any comments or questions?

MR. RILEY: Mr. Stein, I have several comments.

First of all, Mr. Richards, you raised a question

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here with regard to toxicity of the complexed cyanides. Did you have a specific proposal you were going to recommend there? Or is it just an item --

MR. RICHARDS: Yes, I will have a proposal, but I would like to first give you a little background.

In many instances regulatory agencies, including States and the Federal Government, have used the normal free cyanide criteria for determining the toxicity from blast furnace effluents. There has been a little bit of work done by some of the steel companies in this regard, and there is every indication that this is a complexed cyanide that is not in any way as toxic as free cyanide.

Before we put a requirement on this, I think that we need to determine exactly what we are talking about and exactly what toxicity level we are talking about.

MR. STEIN: On that, I think your whole statement, Mr. Richards, is a very constructive statement. I know you and we have been dealing with toxic materials such as cyanides, and I appreciate the point that you are making.

Cyanide in particular, even more than mercury, conjures up certain pictures in the minds of the people -- letting cyanide go in the water. I think in administering the State programs we have had the same kinds of pressures we have had in getting it out.

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I think there is a question that we have to face in something like dealing with these complexed cyanides. And we have statements like that made about various other materials.

As a matter of fact -- and I want to make a point, and I don't mean this necessarily to apply to cyanides -- there was a time when I myself and I am sure all the men at this table, maybe 2 or 3 years ago, thought when mercury was tied up and was put in the water it was one of the safest things you could do because it wasn't going to get out.

Now, the question that I have is how much time would we have to take to get a reasonable agreement that we are going to be able to apply to the whole country on toxic cyanide? Or if we are going to have an active program will we have to go with what we have now perhaps on free cyanide with the recognition that it may be tighter than we are asking and possibly relinquish it later?

I have one subsidiary question which I think may be important. Is it feasible to use the free cyanide tolerances that we use now and to have the steel companies get down to that level? Or will it mean that much additional expenditure of money?

Again, let me recap this. I do not think that

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in controlling cyanides from the blast furnaces we can afford to wait 3, 4, 5 years until someone is going to come up with another number or another criterion. I don't think the problem will wait that long.

I would like your comment on that.

MR. RICHARDS: Well, I think that this matter could be resolved in a rather short time if the energy was put to it.

One of the bases for my comments in this regard is that if the cyanide that we measure as cyanide coming out of the blast furnace were free cyanide, we would have one hell of a terrific fish kill all the time below our major steel mills.

MR. STEIN: You wouldn't have any fish to be killed.

MR. RICHARDS: That's right.

So this is one reason that I think we are dealing with a product that is not exactly what we are measuring with our present chemical test. But I say I think with proper energy applied to this thing you could resolve this problem in 3 or 4 months' time.

MR. STEIN: You do think so?

MR. RICHARDS: Yes, sir.

MR. STEIN: Well, --

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MR. RICHARDS: I think this would be a good job for the Taft Center.

MR. STEIN: -- I don't know. This is a question that I think possibly the conferees can take up. I know that the steel companies are very interested in this problem too. I don't think that I can make an evaluation certainly without looking at the state of the art to see how far they have proceeded.

Do you know anything about this problem, Mr. Ferguson?

MR. FERGUSON: No, I don't, Mr. Chairman, but I will say that it is a fine offer and attitude of Mr. Richards. I don't see why we couldn't pool our resources and come up with a suitable answer on it, because I think it's highly important.

MR. STEIN: All right. I think this is something that the conferees should consider.

Would you go on, Mr. Riley?

MR. RILEY: Yes. Mr. Richards, I had several other questions or just clarifications here.

On page 3 of your statement you discuss a paper mill which is discharging 90 percent of its wastes to a municipal plant, and it is expected that the remainder will be discharged to this municipal plant within the next year.

I am wondering, inasmuch as we have this schedule variance or difference between industry and municipalities -- that is, the 1977 date versus whatever the date was that you gave for industry --

MR. RICHARDS: 1969.

MR. RILEY: 1969. -- if there were any plans by this municipality to possibly speed up the installation of secondary treatment inasmuch as this industry was --

MR. RICHARDS: This municipality happens to be the one that will probably take the longest time. It is Steubenville. It would be probably the largest project in the upper Ohio Basin.

They have started on preparation, or the engineers have been authorized to do a general plan, but with general planning and detailed planning and then construction time I would say-- However, this will not prevent them I think from taking the rest of this waste. It is a matter of solids handling.

MR. STEIN: Right, but then again that's the point, and I think you raised the point about these dates. I think that is a very significant point. That is, the industries have to be constructed by 1969. The municipalities have a tremendous time disparity -- 1977.

Now, we also do know that in appropriate cases

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industries can hook into a municipal system. If the industry takes that course and hooks into the municipal system, then the wastes are not required to have secondary treatment until 1977, and we get that lag.

That is why I do think this spotlights the problem that we have.

While I am talking on the subject, I also do think -- maybe Mr. Horton will want to talk about this too -- in a river like this, which flows between the two States, the figures of West Virginia and Ohio are going to have to be reasonably consistent on this.

Let us assume that West Virginia had all its municipal wastes cleaned up by the beginning of 1975 and they had to wait 2 more years. I don't know that they would have much better water quality during the 2 years.

I think the conferees should address themselves to getting those dates somewhat closer together, if not right together.

Mr. Riley.

MR. RILEY: Again on page 3, where you discuss heated water discharges, you indicate that no facilities are provided for the cooling of these heated water discharges. I was just curious whether or not by permit modification or whatever you were requiring some sort of --

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MR. RICHARDS: As I pointed out, the only one that is outside of the effluent criteria established by ORSANCO is the Sammis plant, and this is a very minimal amount of override, you might say, which probably will not happen.

MR. STEIN: There is a question here. Again, you know, I think things are going on so well. I know ORSANCO put this in. But we did meet with the States and we have arrived at certain agreements I think with the Ohio River States on temperature requirements too, and the Sammis plant is somewhat above it you point out at critical periods. I think the question is whether you are contemplating asking them to put in any modification of their discharge at this point in time or let this go as it is.

MR. RICHARDS: We are not contemplating right now asking them to proceed with cooling towers.

MR. STEIN: Not necessarily cooling towers, but are there any other modifications such as diffusers or anything of that kind which may not --

MR. RICHARDS: Well, I should point out that these are actual computations --

MR. STEIN: I understand.

MR. RICHARDS: -- of the effect on the total

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river. We do know from some studies that have been made that the total river at that location is not affected by this discharge.

MR. STEIN: But the answer to the question is you are not asking the Sammis plant to make any kind of modification at the present time in its method of discharge of heated water?

MR. RICHARDS: No. We think that they have an adequate method of discharge to the river.

I should point out here that these calculations and ORSANCO's criteria are directed at meeting the water quality standards. Now, if we have an indication that water quality standards for temperature in the Ohio River below the Sammis plant are being violated, then we will require the industry to take the necessary corrective action.

MR. RILEY: All right. Now, referring to page 7 of your statement, in particular regard to municipalities, you refer to the fact that where necessary permits have called for studies for the abatement of pollution from combined sewer overflows and the adoption of programs for the reduction of stormwaters in sanitary inland sewers.

To follow up our discussion regarding Salmonella problems, I think I mentioned at that time the problem from combined sewers. I was curious here what sort of time

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frame you are looking at, if you have designated a time frame for the preparation of feasibility reports, and so forth, for combined sewers.

MR. RICHARDS: Well, these are continuing studies you might say, and these permits are normally issued on a 1-year basis. They make reports periodically as to the progress being made in this regard.

Truthfully, I think I should say that probably the correction of this would somewhat depend upon the amount of Federal dollars that are going to be available for this purpose, because it is a very expensive project.

MR. RILEY: Right. But have you set any time schedules or goals?

MR. RICHARDS: No. This would have to be done on an individual basis, because the problems in each location are entirely different and have to be approached again from purely a financial situation.

MR. RILEY: That's all I have for Mr. Richards' statement.

I did want to close here by indicating that in the Federal presentation there were two minor errors which should be corrected. Do you have those, John?

MR. FERGUSON: If you refer to your copy of Mr. Cantor's statement, on page 8, under item B, industries not

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in compliance, but excluded from consideration by this conference in view of pending lawsuits, the No. 2 plant is the Wheeling-Pittsburgh Steel coke plant at Follansbee.

And on page 9, industry No. 3, strike "coke plant."

MR. STEIN: Mr. Richards, I would like to call attention to something you have in here which indicates why we have the conference. Maybe there is another way of doing this, but I don't see it.

For example, on page 8 you say that one steel company has just completed its facilities on October 1, some 90 days after the scheduled completion date. I think all of us who have been in this business a considerable time would consider that more or less on schedule. That's what the airplanes figure. If you come in 15 minutes late you're on schedule.

But you say two other steel companies have facilities under construction with completion schedules of December 1972 and these measures are being installed in accordance with findings and orders of the Ohio Water Pollution Control Board after a show cause hearing late last year.

Now, with these slippages, this is where we come up with the problem. That is, we have dates which are

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Federal dates as well as State dates. Some people have said when you do this that this is a unilateral extension. This is what I hear on one side. I say we have to get together and talk to you.

On the other hand, when the Federal Government comes up with making a suggestion for a reasonable extension, then we hear cries from people in some of the States, not necessarily here, that we're tampering with the standards.

But I think these problems inevitably will arise, and that is why I think we have to get together in these conferences to do that -- in other words, to have us comply with our law and with your law. I think if a company has a legitimate extension they should have that extension simultaneously, if possible, from the Federal and State government and not be exposed to a situation where one is giving it to them and not the other one.

I think you put your finger on why we are going to have to get together in a cooperative program. Because, as I pointed out, you are never going to wave a magic wand and get everyone to complete their work on the scheduled date that we have set, say, 5 years ago. Maybe "never" is a big word. But if you ever do that, it will be the first time.

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MR. RICHARDS: In reply, you noted that the Ohio Water Pollution Control Board did have a show cause hearing and issued orders to these facilities, and this was because they were behind schedule.

MR. STEIN: That's right.

MR. RICHARDS: We thought that the Federal Government was completely informed of this situation, because people from Mr. Ferguson's office, people from Mr. Harlow's office, and people from the Cincinnati office, as well as from the Evansville office, come to our office about every 6 months and review these schedules and the exact status of this.

So the Federal Government is informed. Whether or not they agree I can't tell you.

MR. STEIN: That's right, and this is why again I think this is worth going into, because this is the crux of the issue.

The fact that the Federal Government is informed does not mean if a schedule, say, set in 1969 and approved by the Administrator or the Secretary of the Interior has been changed because of some action, however formal, that a State took, that it has been changed from the point of view of the Federal Government. The only way we can modify that is by doing something in accordance with the

Federal law in the same way that you have the show cause order under the State law.

The purpose of this is working to dovetail both those programs so we see eye to eye and we move in step. Because I think the equity that the companies require is that we don't have different regulations against them and different time schedules against them.

MR. RICHARDS: This matter of schedule modification has been with us for a long time.

MR. STEIN: That's right.

MR. RICHARDS: And I believe if I am not mistaken -- and you may correct me on this -- that this procedure that Mr. Riley referred to was something that came up rather recently, wasn't it?

MR. RILEY: April of this year.

MR. RICHARDS: Yes. So before that there didn't seem to be any way to do it other than tell you about it.

MR. RILEY: A lot of discussion.

MR. STEIN: Okay. There is a way in the statute, sir. But that is much more involved to go through than just telling us about it. I don't blame you for taking the easy course. But I don't know that that's legal.

All right.

MR. RICHARDS: It only became illegal last April.

J. E. Richards.

MR. RILEY: I have one further question here. Correct me if I am wrong. You recommended that this conference endorse the time schedules I think prepared and published by ORSANCO in September of this year. Is that right? Did you make that recommendation?

MR. RICHARDS: Yes, sir, and as they may be modified, because, hopefully, those will be modified with reference to municipalities.

MR. RILEY: I just wanted to make one point with regard to those schedules. One of the reasons we are here is in numerous cases, or some cases, the schedules are not complete, in that interim dates are not specified. I think this is the sort of thing we want to address ourselves to.

MR. RICHARDS: Those ORSANCO schedules do have interim dates for plans, plan approval, and construction. Right, Bob?

MR. HORTON: Right. Yes.

MR. STEIN: Well, is your question that you want some more detailed interim dates?

MR. RILEY: What I am saying is that in reviewing those schedules I found numerous instances where interim dates weren't included, and I am just saying that, hopefully, we as conferees can address ourselves to that and try to establish some of these things.

J. E. Richards
Robert Horton

MR. STEIN: We will take that up in the executive session.

MR. RILEY: Right.

MR. STEIN: As you know, generally speaking I think, the profession does recognize certain things that we have for interim dates, and I don't think there should be any argument on what we're looking for for interim dates. If so, we can discuss it. I think that might be best handled in executive session.

MR. RICHARDS: Okay.

MR. STEIN: Any other comments or questions?

(No response.)

If not, we will hear from Mr. Horton.

STATEMENT OF

ROBERT HORTON

EXECUTIVE DIRECTOR AND CHIEF ENGINEER

OHIO RIVER VALLEY WATER SANITATION COMMISSION

(ORSANCO)

MR. HORTON: Mr. Chairman, conferees, ladies and gentlemen, my name is Robert Horton. I am Executive Director and Chief Engineer of the Ohio River Valley Water Sanitation Commission. This is an interstate agency that was created by eight States in the valley that became effective in 1948.

Robert Horton

I would like to say first, Mr, Chairman, that I deeply appreciate your opening remarks and the remarks made by Mr. Cantor referring to ongoing programs in this stretch of the Ohio River, proposals by the States involved and by the interstage agency.

Under the compact, the basic purpose of the compact was to pledge the States to coordinate their efforts in controlling pollution in the Ohio and in its interstate tributaries.

I would like to supplement what has been said by the States and by the EPA about the ongoing program. I would like briefly to show a few slides that will indicate some trends in water quality that have occurred over the past year. I would also like to comment a little further briefly on the EPA report.

But as a starter I just would like to cite these figures as some measure of how well the States -- how well or how poorly the States -- have proceeded to redeem their pledge under the compact.

One measure is this: In 1948, when the compact was signed, there was virtually no sewage treatment on the Ohio River, and now today 99.5 percent of the population is served by sewage treatment plants. As has been said, these plants are primary plants, but already work is under

way in many places to upgrade these plants to secondary plants. In fact, all of the cities and communities on the river are under a requirement to install secondary facilities.

I think it is interesting to point out that, of the plants that have been built, about 75 percent of them were built prior to the advent of Federal construction grants.

By the same token, there has been a good deal of progress made by industries, and at least 90 percent of the industries on the river are complying with what we term as minimum or basic requirements.

As I say, I just point this out to further add perspective to what the chairman has said in opening this conference in recognizing existing programs.

Just a word or two about the EPA report. There are some things in there that are, well, I might say, difficult for me to understand or at least to follow how some of the conclusions and recommendations were arrived at. I will just cite a couple of examples.

We have already gone over the Salmonella question, and there is no need to dwell on that, just so long as we recognize that the possibility is that we might still have Salmonella even after all of these treatment requirements

Robert Horton

are met.

The report in the appendix contains a very fine study on aftergrowth of bacteria and Salmonella. So you wonder if some of these counts-- I think the report shows that maybe in 7 to 14 days you can get a regrowth and a count of 10 times what the initial count was. I don't know, but maybe some of the counts that have been observed are a result of this aftergrowth.

Another part of the report that disturbs me in reaching conclusions has to do with the coliform objective which is really expressed in terms of the monthly average value, and provisions are made for a certain amount of overrun. And yet in the report at some stations samples were taken twice a month and from that conclusions reached regarding meeting this kind of criterion, the monthly average, which is rather hard to do.

Another thing is that although some effluents were sampled and data is given, there is no data on volume of waste, and here again it is sort of hard to reconcile the data with some of the conclusions.

If you start figuring it out, just taking three constituents, phenol, cyanide, and lead -- I just happen to have this one example that was worked out for me -- it says that at one outfall, at mile 61.93, and considering the

Robert Horton

critical flow of 6,600 cfs, which is the minimum flow once in 10 years, it would take about 82 million gallons per day of waste -- that is, of this waste that was sampled at that point -- to exceed the phenol limit.

It would take a discharge of 70 million gallons a day to exceed the cyanide limit.

It would take a discharge of 2,450 million gallons a day to exceed the lead limit.

So you sort of wonder. Are wastes going in at this particular volume?

One other thing about the report. The statement is made about the tributaries in this stretch of the river being polluted with mine drainage. Maybe they are, and I can't question their statement. But I can say that no data is presented in the report except for Harmon Creek. On Harmon Creek there is some data.

So we have the statement that they are polluted, but we are not provided with the data to show us how badly they are polluted.

Turning back now to the programs -- and we have heard from the State of West Virginia and from the State of Ohio about their programs -- the ORSANCO program has been referred to several times, and one of the things that has been referred to is the effluent standards which were

Robert Horton

adopted by the eight States last November.

With your permission, Mr. Chairman, I would like to submit a copy of those effluent standards for the record.

MR. STEIN: Without objection, they will be included in the record as if read.

(The above-mentioned standards follow.)

OHIO RIVER VALLEY WATER SANITATION COMMISSION

An interstate agency representing: Illinois • Indiana • Kentucky • New York • Ohio • Pennsylvania • Virginia • West Virginia. Headquarters: 414 Walnut Street, Cincinnati, Ohio 45202

Notice of Requirements (Standards Number 1-70 and 2-70) Pertaining to Sewage and Industrial Wastes Discharged to the Ohio River

You are hereby notified that on November 13, 1970, the Ohio River Valley Water Sanitation Commission, acting in accordance with and pursuant to authority contained in Article VI of the Ohio River Valley Water Sanitation Compact, established, subject to revision as changing conditions require, the attached standards for the modification or treatment of all sewage from municipalities or other political subdivisions, public or private institutions, corporations, or watercraft, and for the modification or treatment of all industrial wastes discharged or permitted to flow into the Ohio River from the point of confluence of

the Allegheny and Monongahela rivers at Pittsburgh, Pennsylvania, designated as Ohio River mile point 0.0, to Cairo Point, Illinois, located at the confluence of the Ohio and Mississippi rivers, and being 981.0 miles downstream from Pittsburgh, Pennsylvania.

Under terms and provisions of the Ohio River Valley Water Sanitation Compact all sewage from municipalities or other political subdivisions, public or private institutions, corporations or watercraft and all industrial wastes discharged or permitted to flow into the Ohio River will be required to be modified or treated to the extent specified in the attached standards.

Robert K. Horton
Executive Director and Chief Engineer

**DEFINITIONS AND PROCEDURES FOR APPLICATION OF
POLLUTION CONTROL STANDARDS NOS. 1-70, 2-70**

The following definitions and application procedures are incorporated as part of Pollution Control Standards Nos. 1-70, 2-70:

(a) "Sewage" means the water carried human or animal wastes from residences, buildings, industrial, commercial or governmental establishments, public or private institutions, watercraft and floating facilities, or other places, together with such groundwater infiltration and surface-waters as may be present. The admixture with sewage, as defined, of industrial wastes, as hereinafter defined, shall also be regarded as sewage;

(b) "Industrial waste," other than cooling water, means any liquid, gaseous, solid material or waste substance or combination thereof including garbage, refuse, decayed wood, sawdust, shavings, bark, sand, lime, cinders, ashes, offal, oil, tar, dyestuffs, acids, chemicals, heat and all discarded matter resulting from any process or operation, including storage and transportation, manufacturing, com-

mercial, agricultural and government operations, or from the development and recovery of any natural resources;

(c) "Cooling water" means water used as a heat transfer medium to which no process, waste or other materials, exclusive of chlorine, are added intentionally or unintentionally prior to discharge;

(d) "Substantially complete removal" means removal to the lowest practicable level attainable with current technology;

(e) Methods for determining waste constituents and characteristics shall be those set forth in the most recent edition of "Standard Methods for the Examination of Water and Wastewater," prepared and published jointly by the American Public Health Association, American Water Works Association, and the Water Pollution Control Federation, except that such other methods may be used as are approved by the Commission.

POLLUTION CONTROL STANDARD NO. 1-70

All sewage from municipalities or political subdivisions, public or private institutions, or installations, or corporations, or watercraft, and all industrial wastes, other than cooling water as hereinafter defined, discharged or permitted to flow into the Ohio River from the point of confluence of the Allegheny and Monongahela rivers at Pittsburgh, Pennsylvania, designated as Ohio River mile point 0.0, to Cairo Point, Illinois, located at the confluence of the Ohio and Mississippi rivers, and being 981.0 miles downstream from Pittsburgh, shall be so treated or otherwise modified as to provide for:

- A. Substantially complete removal of settleable solids;
- B. Substantially complete removal of oil (in whatever state, including free, emulsified, dispersed and dissolved oils), debris, scum, and other floating materials;
- C. Reduction of suspended solids, dissolved solids and other materials to such degree that the discharge will not produce turbidity, color or odor in the river, or impart taste to potable water supplies, or cause the tainting of fish flesh;
- D. Reduction of any and all constituent materials to such a degree that the concentration thereof, singly or in combination, in any discharge is not harmful to human health, and reduction of the following

chemicals to such a degree that the concentrations thereof in any discharge do not exceed (1) the limits specified in the tabulation below or (2) such lower limits as may be required for compliance with subparagraph (E) of this Pollution Control Standard No. 1-70:

Inorganic chemicals	Limiting concentration (mg/l)
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium (hexavalent)	0.05
Lead	0.05
Mercury	0.005
Selenium	0.01
Silver	0.05
Organic chemicals	
Cyanide	0.2
Pesticides	
Aldrin	0.017
Chlordane	0.003
DDT	0.042
Dieldrin	0.017
Endrin	0.001
Heptachlor	0.018
Heptachlor epoxide	0.018
Lindane	0.056
Methoxychlor	0.035
Organic phosphates plus carbamates (as parathion equivalent cholinesterase inhibition)	0.1
Toxaphene	0.005
Herbicides	
2,4-D plus 2,4,5-T plus 2,4,5-TP	0.1

E. Reduction of any material or, if necessary, all materials contained in any discharge which singly or in combination are toxic or harmful to aquatic life to such a degree or degrees that the calculated concentration(s) of such material or materials in the river does not exceed one-twentieth of the 96-hour median tolerance limit (96-hr. TL_m) for aquatic life;

F. Reduction of radioactive materials to such degree that (1) concentrations of *unidentified* radionuclides in the discharge do not exceed (a) 30 pCi or (b) limiting values specified by the Atomic Energy Commission for water in which certain radionuclides are known to be absent, as set forth in Column 2, Table II, Paragraph 3.C, Notes to Appendix B, Title 10, Chapter 1, Code of Federal Regulations (January 1, 1970), or (2) concentrations of *identified* radionuclides in the discharge do not exceed limiting values for water specified by the Atomic Energy Commission, as set forth in Column 2, Table II, Appendix B, Title 10, Chapter 1, Code of Federal Regulations (January 1, 1970);

G. Reduction of fecal coliform bacteria to such degree that (1) during the months of May through October fecal coliform density in the discharge does not exceed 200 per 100 ml as a monthly geometric mean (based on not less than ten samples per month), nor exceed 400 per 100 ml in more than ten percent of the samples examined during a month, and (2) during the months of November through April the density does not exceed 1,000 per 100 ml as a monthly geometric mean (based on not less than ten samples per month), nor exceed 2,000 per 100 ml in more than ten percent of the samples examined during a month;

H. Control of hydrogen ion concentration to such degree that the pH is not less than 5.0 nor greater than 9.0;

I. Reduction in 5-day biochemical-oxygen-demand load (pounds per day) of not less than 92 percent (as a monthly-average value), provided, however, that a lesser degree of reduction may be applied, but not less than 85 percent (monthly-average value), if as a result the biochemical-oxygen-demand (BOD) load does not exceed that amount which will increase the BOD of the river, on a calculated basis, by more than 0.05 milligrams per

liter at flows equal to or exceeding "critical" flow values specified in the following table:

River Reach		Critical flow in cfs*
From	To	
Pittsburgh (mi. 0.0)	Willow Is. Dam (161.7)	6,600
Willow Is. Dam (161.7)	Gallipolis Dam (279.2)	7,700
Gallipolis Dam (279.2)	Meldahl Dam (436.2)	9,900
Meldahl Dam (436.2)	McAlpine Dam (605.8)	12,100
McAlpine Dam (605.8)	Uniontown Dam (846.0)	14,300
Uniontown Dam (846.0)	Smithland Dam (918.5)	20,000
Smithland Dam (918.5)	Cairo Point (981.0)	48,500

* Minimum 7-day flow once in ten years.

J. Reduction of heat content to such degree that the aggregate heat-discharge rate from the municipality, subdivision, institution, installation or corporation, as calculated on the basis of discharge volume and temperature differential (temperature of discharge minus average upstream river temperature), does not exceed the amount calculated by the following formula, provided, however, that in no case shall the aggregate heat-discharge rate be of such magnitude as will result in a calculated increase in river temperature of more than 5 deg. F.;

$$\text{Allowable heat-discharge rate (Btu/sec)} = 62.4 \times \text{river flow (cfs)} \times (T_d - T_R) \times 90\%$$

Where:

T_d = Allowable maximum temperature (deg. F.) in the river as specified in the following table:

	T_d		T_d
January	50	July	89
February	50	August	89
March	60	September	87
April	70	October	78
May	80	November	70
June	87	December	57

T_R = River temperature (daily average in deg. F.) upstream from the discharge

River flow = measured flow but not less than critical flow values specified in the following table:

River Reach		Critical flow in cfs*
From	To	
Pittsburgh, Pa. (mi. 0.0)	Willow Is. Dam (161.7)	6,500
Willow Is. Dam (161.7)	Gallipolis Dam (279.2)	7,400
Gallipolis Dam (279.2)	Meldahl Dam (436.2)	9,700
Meldahl Dam (436.2)	McAlpine Dam (605.8)	11,900
McAlpine Dam (605.8)	Uniontown Dam (846.0)	14,200
Uniontown Dam (846.0)	Smithland Dam (918.5)	19,500
Smithland Dam (918.5)	Cairo Point (981.0)	48,100

* Minimum daily flow once in ten years.

POLLUTION CONTROL STANDARD NO. 2-70

All cooling water from municipalities or political subdivisions, public or private institutions, or installations, or corporations discharged or permitted to flow into the Ohio River from the point of confluence of the Allegheny and Monongahela rivers at Pittsburgh, Pennsylvania, designated as Ohio River mile point 0.0 to Cairo Point, Illinois, located at the confluence of the Ohio and Mississippi rivers, and being 981.0 miles downstream from Pittsburgh, Pennsylvania, shall be so regulated or controlled as to provide for reduction of heat content to such degree that the aggregate heat-discharge rate from the municipality, subdivision, institution, installation or corporation, as calculated on the basis of discharge volume and temperature differential (temperature of discharge minus upstream river temperature) does not exceed the amount calculated by the following formula, provided, however, that in no case shall the aggregate heat-discharge rate be of such magnitude as will result in a calculated increase in river temperature of more than 5 deg. F.:

$$\text{Allowable heat-discharge rate (Btu/sec)} = 62.4 \times \text{river flow (cfs)} \times (T_A - T_R) \times 90\%$$

Where:

T_A = Allowable maximum temperature (deg. F.) in the river as specified in the following table:

	T_A		T_A
January	50	July	89
February	50	August	89
March	60	September	87
April	70	October	78
May	80	November	70
June	87	December	57

T_R = River temperature (daily average in deg. F.) upstream from the discharge

River flow = measured flow but not less than critical flow values specified in the following table:

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Gallipolis Dam (279.2)	Meldahl Dam (436.2)	9,700
Meldahl Dam (436.2)	McAlpine Dam (605.8)	11,900
McAlpine Dam (605.8)	Uniontown Dam (846.0)	14,200
Uniontown Dam (846.0)	Smithland Dam (918.5)	19,500
Smithland Dam (918.5)	Cairo Point (981.0)	48,100

* Minimum daily flow once in ten years.

Robert Horton

MR. HORTON: These are legally enforceable standards, and they are being implemented by the States involved.

MR. STEIN: Enforceable by whom? I ask that as an inquiry.

MR. HORTON: Fine. Under the compact itself they are enforceable. The compact empowers the Commission to issue orders and to seek enforcement of those orders -- I believe the words are -- through any court of general jurisdiction.

MR. STEIN: Yes, I know, Mr. Horton -- I haven't read that compact for years, but I used to work on that -- but isn't there also a provision that what you have to do is get the majority of the States to go with you, including the State in which the discharge is located?

MR. HORTON: That's correct.

MR. STEIN: In other words, in order for you to enforce these effluent standards, you would have to get the majority of States in the compact to go, and the State which the discharge is coming from would have a veto power?

MR. HORTON: That is absolutely correct.

MR. STEIN: Right.

MR. HORTON: And I would like to comment on that. Because the compact was intended I'm sure -- or I'm told --

Robert Horton

and has been used -- as a supplement only to State efforts. Only in cases where a State feels that it has exhausted its own remedies for enforcement would the compact come into play.

For this reason there have been very few cases over the years, but there have been some. There have been about six incidents where a State -- for example, the State of Ohio is one -- had a little town that was not building a sewage treatment plant, and the case got tied up in a local court, and it just stood there for years and nothing was done.

So the State came to the Commission and asked the Commission to intervene, which it did and proceeded down the path looking toward getting the case into, say, Federal court.

Somewhere along the line this particular community fell in line and built its sewage treatment plant.

But that is the way the enforcement machinery has operated. And you are absolutely right that for it to work it does require a majority vote of the commissioners, including the vote of the commissioner from the State involved.

Now, one further comment on that. We have talked about timetables, and Mr. Richards has referred to the

Robert Horton

timetables that have been submitted to ORSANCO. These timetables were reviewed first last June, and they were reviewed again in September, and they will be a matter of constant review by the Commission.

At our last meeting, which was held toward the end of September, there were five communities and one industry where -- oh, I'll use the word "slippage" -- there had been slippage. So these cases were reviewed, and they are now under intensive investigation by our staff looking toward-- Well, I can't anticipate what action will be taken. But at least they are under review for action if this appears to be necessary.

With that, and just to give further perspective, Mr. Chairman, I would like to show a few slides if I may.

MR. STEIN: Sure. Go ahead.

MR. HORTON: These are slides where we have attempted to show changes that have occurred in certain water quality characteristics over the years.

(Slide)

Robert Horton

What we have plotted here is percent of time criterion was met. To us this is one of the most meaningful measures of progress or lack of progress.

We all have criteria or standards, call them what you will, and I think one of the things that we really want to know is: Are we meeting them or are we not meeting them? Or what percent of the time are we meeting them?

The chart at the top of the screen happens to show dissolved oxygen data at one of our monitoring stations, which is at Stratton, Ohio. This is mile 55, which is just upstream from the area of the river under consideration here.

On the Y axis we have plotted percent of time that our dissolved oxygen criterion was met, and on the X axis we have plotted years.

For example, the chart shows that in 1963 we were meeting our dissolved oxygen criterion roughly 80 percent of the time. As you look at the chart, it seems apparent that there is a steady upward trend and that we have gradually worked up, and actually in 1970 that criterion was met 100 percent of the time at that station.

The chart at the bottom of the screen is a plot of a similar kind of data at Willow Island, which is at mile 161, which is downstream from the conference area but is the

Robert Horton

closest station where we have an automatic monitor. This is the closest downstream station we have. Unfortunately, the monitor was not installed in this location until 1969, so we actually only have 2 years of record there.

But, even so, it shows that at that station in 1970 the dissolved oxygen criterion was met 100 percent of the time.

Give me the next chart, please.

(Slide)

OCT 13 1974

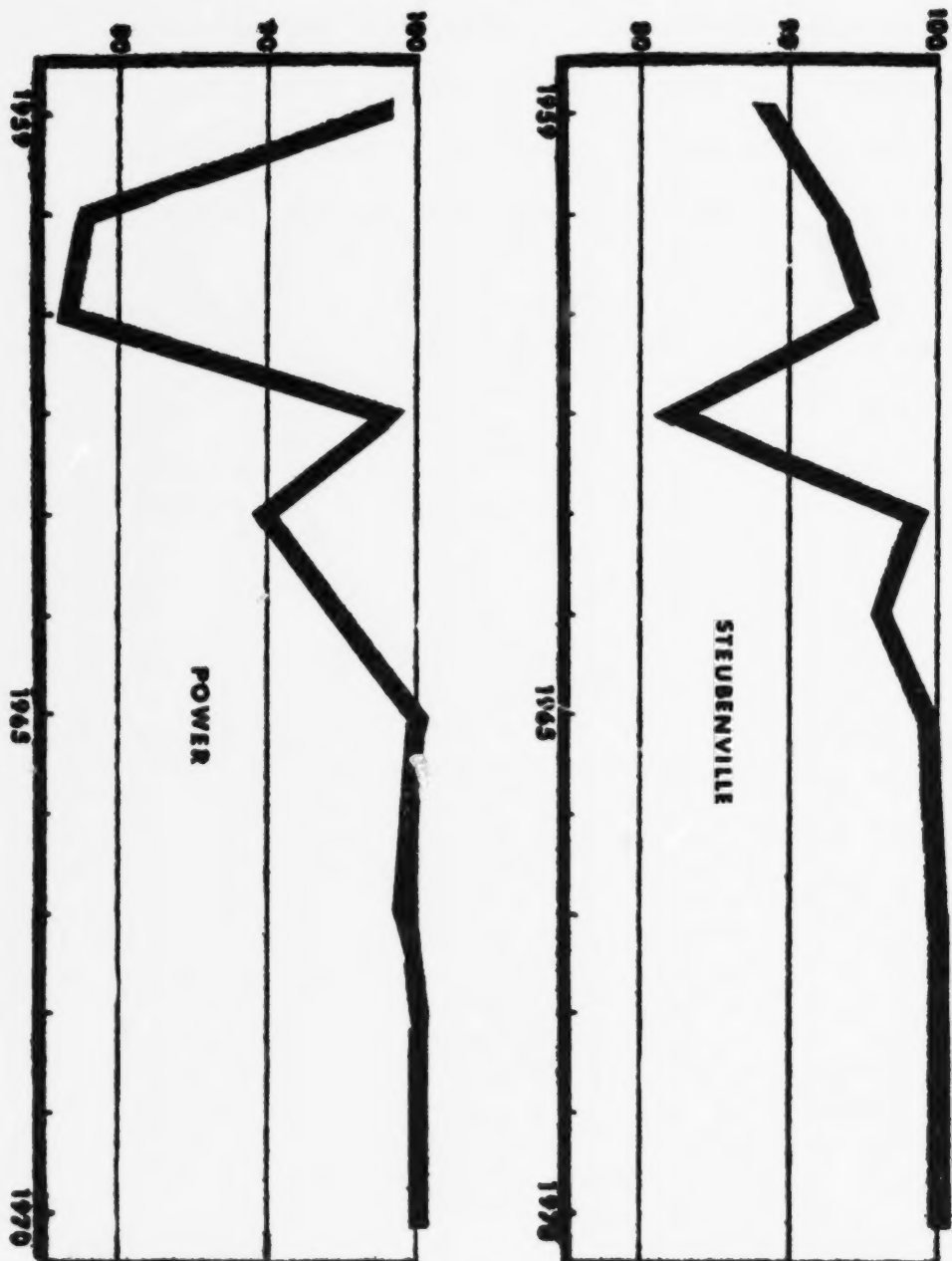
OHIO RIVER VALLEY WATER SANITATION COMMISSION

NOTES

as noted on

PERCENT OF TIME

Percent of Time pH Criterion Was Met



Robert Horton

This is a plot again plotting percent of time criterion was met on the Y axis against the years. This is a plot of pH data.

The chart at the top of the screen is data at Steubenville, which is at mile 65. Again, it starts off at a little less than 90 percent of the time meeting the criterion in 1959, and it would appear that there is -- although there are ups and downs -- a gradual improvement up to 100 percent of the time in 1970.

The chart at the bottom of the screen is pH data at Power, West Virginia, which is at mile 79. Again you will see fluctuations up and down, but certainly it appears to be an upward trend there.

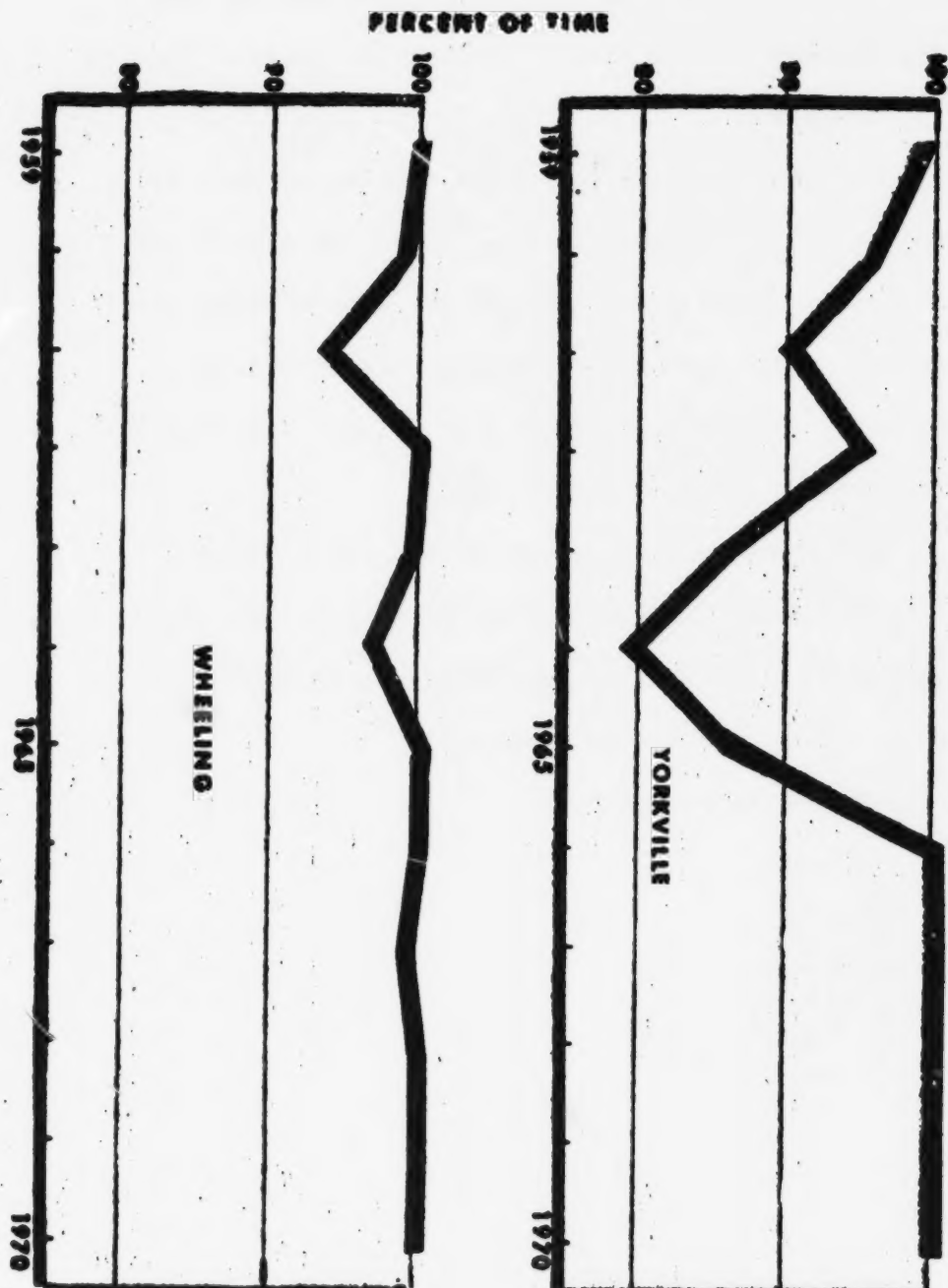
On the next chart --

(Slide)

OCT 13 1971

NOTES OND RIVER VALLEY WATER SANITATION COMMISSION

Percent of Time pH Criterion Was Met



Robert Horton

-- we have plotted more pH data. The chart at the top of the screen is data at Yorkville, Ohio, mile 84. You see a downward trend during the years 1959 to about 1964, and since then it has come up.

The chart at the bottom of the screen is pH data at Wheeling. It has gone along with some ups and downs, but for the last several years it has been up there at 100 percent.

May I have the next chart, please?

(Slide)

VISUAL NO. _____
SUBJECT _____

366

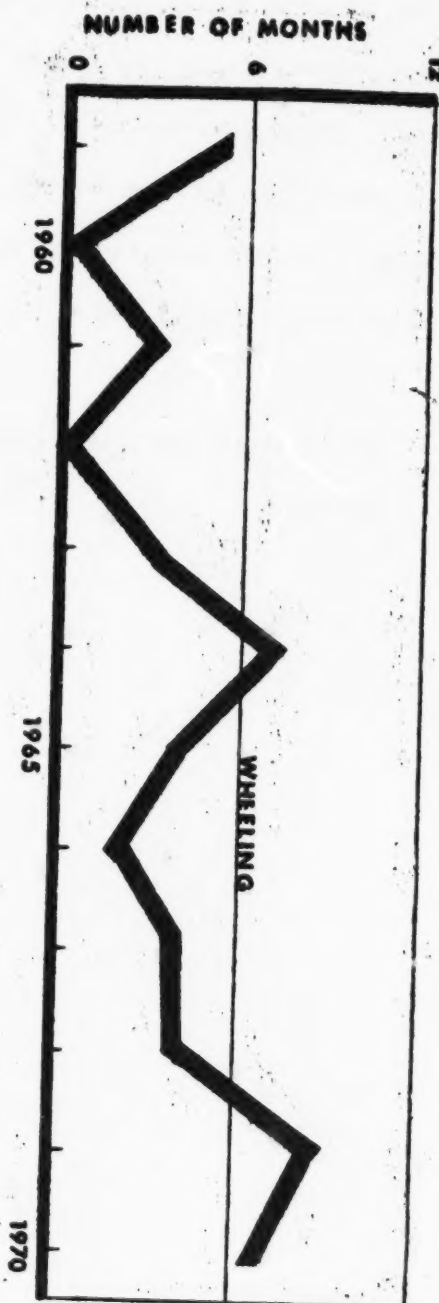
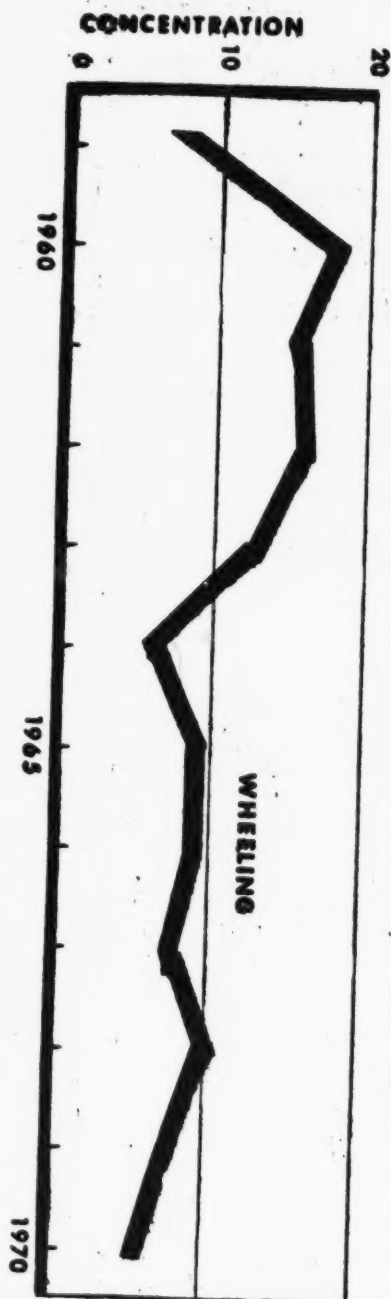
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NOTES OHIO RIVER VALLEY WATER SANITATION COMMISSION

OCT 13 1971

Robert Horton

This chart is a plot of phenol data. In the first chart at the top of the screen we just plotted number of months that the average phenol concentration was less than 5 parts per billion. Instead of plotting the percent of time, we just plotted the number of months.

So here again we have ups and downs, but it would certainly seem that there is an upward trend. In other words, the percent of time that the concentration is less than 5 parts per billion seems to be increasing, which, of course, is what we want.

The chart at the bottom of the screen is a different kind of plot. Here we have plotted on the Y axis yearly average phenol concentrations. This too is at Wheeling. And we have plotted years on the X axis. This is a yearly average concentration.

Hopefully, this will go down, and it would seem that there is a downward trend here, and we hope certainly that it would continue. This is a chart where you want it to go down because you are actually plotting concentration there.

Now the last chart.

(Slide)

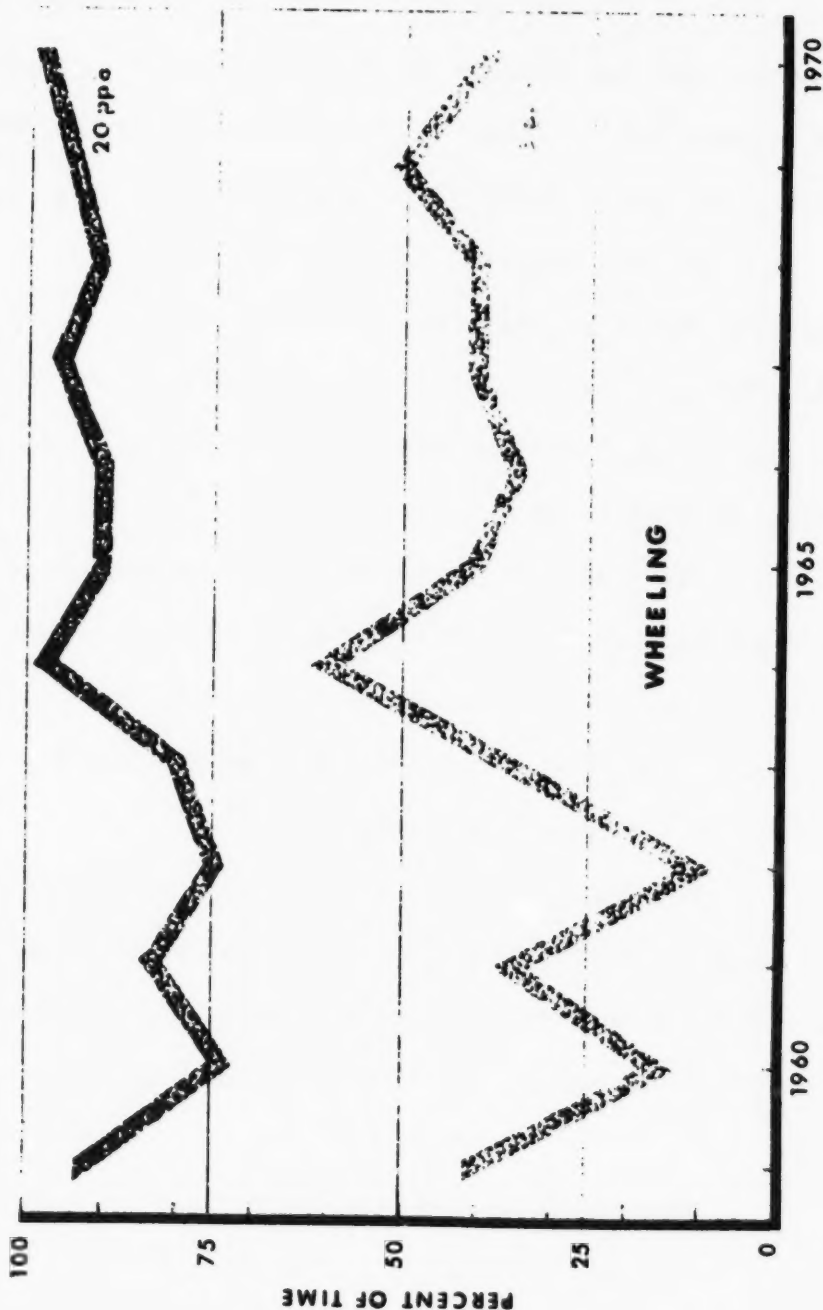
VISUAL NO. 5 Wheeling
 SUBJECT Phenol-2

368

3M BRAND MONITORING REPORT

Visual Products Division 3M

**Percent Of Time Phenol Equal To Or Less
 Than Specified Concentration**



NOTES

WHEELING VALLEY WATER SANITATION COMMISSION

SEP 13 1971

Robert Horton

This is phenol data again at Wheeling. Here we have plotted percent of time that phenol concentrations were less than certain amounts.

The top curve is the percent of time that phenol concentrations at Wheeling were less than 20 parts per billion, and the bottom curve the percent of time that concentrations were less than 5 parts per billion.

Here again, if we are to get improvement, both of these curves should trend upward, and it appears that they are.

That concludes that part of my presentation, Mr. Chairman.

I will just conclude by saying again we appreciate the fact that you and EPA recognize the ongoing programs. They have been explained by the States of West Virginia and Ohio. So far as any comments on the specific recommendations, I would like to reserve those until the conferees get together in executive session.

MR. STEIN: Right. Thank you.

MR. HORTON: Thank you very much.

MR. STEIN: Are there any comments or questions?

MR. FERGUSON: I might make a few comments.

On the question, of course, as to how conclusions and recommendations were arrived at, this same question I

Robert Horton

believe was raised at Pittsburgh, and you certainly have the right to question this. The conclusions and recommendations were arrived at on the basis of the analysis of the data we had on the special studies that were made. And that's about all I think a person can say on that. Each one probably looking at data might arrive at different conclusions and recommendations to some extent.

It is true, of course, that with long-term data where you take it constantly, day after day or week after week or month after month, from a statistical average standpoint you come out with better data. And this might be a valid criticism. But as far as we are concerned, nearly every time that we have checked coliform concentrations in the Ohio River they essentially have always been above the established water quality standards.

On the statement, Bob, on the mine drainage data, it is true that none of this was included in the report. However, I do want to invite your attention to the fact that the Wheeling office has published several work documents dealing with mine drainage on specific watersheds, and I believe that in nearly all cases these reports have been provided to your office.

There are many tributaries -- I just cite two, Wheeling Creek, Ohio and Wheeling Creek, West Virginia --

Robert Horton

on which a lot of mine drainage has been documented.

McMahon Creek is another one.

We have a work document put out 3 or 4 years ago, which we call Work Document 21, that is an investigation of all of the mine drainage in the upper Ohio River Basin. And this documents with adequate data I believe-- At least it is accepted in most circles as being very adequate in terms of mine drainage data.

The conclusion arrived at was based on this data without necessarily having to put an inch-thick publication in the conference report. So we believe that has been documented.

One comment relative to timetables. You mentioned five communities and one industry where the schedule has slipped. It is interesting to note that one of the communities is the community of Wellsburg, and it is also interesting to note that this community of Wellsburg was listed as being delinquent in your 1969 report, and still nothing has been done at Wellsburg.

The curves are always interesting. My only comment really zeros in on the phenolic program at Wheeling. I imagine that most of us who live around this area and drink the water at certain times of the year, particularly most of the citizens back last January and February-- If you

Robert Horton

could have sat in our office and taken the phone calls from irate citizens wondering why something wasn't done about it, you'd get the impression that the trend on phenolic concentrations at Wheeling is not downward, irrespective of some of the data that we might look at.

I believe that is all I have to say.

MR. STEIN: Do you want to reply?

MR. HORTON: No. Thank you very much.

MR. STEIN: The last point was the one that I wanted to raise myself. I think we sort of have an expression in this business, which is a very interesting and fascinating thing to spend your career on, as we do, of the tendency to be a "dismal failure as a beverage." And the question here is do we have a taste and odor problem in the drinking water supply particularly in the Wheeling area? If we do, should we not address ourselves to seeing if the conferees can come up with recommendations for its abatement?

MR. HORTON: Certainly we have a taste and odor problem.

MR. STEIN: Well, if we do, again I think in a modified sense we can say just about what you say about Salmonella, you know. You're not necessarily going to get cause and effect.

Robert Horton

But I hope that the conferees can have a pretty good guess as to what they think may be causing that taste and odor problem, and then, if we can eliminate those sources within a reasonable time, we can see what this does to the water supply. And if it doesn't improve, well, it doesn't improve.

I might say that particularly if we are dealing with phenolic compounds we have had considerable success in eliminating those problems in other parts of the country when we have identified where the sources come from, got these corrected, and the water intakes and the water operators do not indicate that they have the taste and odor problem any more.

So this is the kind of problem I think we can lick if we can put our minds to it. I hope we can.

Are there any other comments or questions?

(No response.)

If not, I think this concludes this portion of the conference.

Does anyone in the audience want to say anything or ask a question now? Because I think we are going into executive session, and you won't have an opportunity after this.

(No response.)

If not, we will recess the conference. The conferees will meet in the staff room at 2:30 p.m., let's say, and hopefully we should have an announcement by 4:30 p.m., when we will come out here and make the announcement on the conclusions and recommendations that we have been able to reach.

With that we will stand recessed.

(Whereupon, at 12:55 p.m., the conference was recessed.)

(The conference was reconvened at 6:00 p.m.)

MR. STEIN: Let's reconvene.

I am happy to announce that the conferees have reached unanimous conclusions and recommendations as far as the law will permit. There are certain recommendations joined by some where the operation of either the compact provisions, Federal requirements, or State requirements didn't permit the conferees all to join. But the conclusions and recommendations were a true consensus.

I think it is fair to say that we are here watching a program unfold which has been an ongoing one and an active one engaged in by the States of Ohio and West Virginia, and we have encountered in this program, as we have in many across the country, certain failures to meet deadlines, and certain slippages in materials and situations have become apparent that perhaps were not that clear to all of us when the program began.

I at the outset would like to commend ORSANCO, Ohio, and West Virginia for their cooperative spirit, for the active programs that they have had, and for the full disclosure of data, information, and views which have enabled us to arrive at these conclusions and recommendations.

The conclusions and recommendations are as

follows:

I should indicate that we only have a single copy of this so far. We are valiantly working with the reproduction machine. If you want to wait, this material will be made available, or if you leave your name we will see that you get it as soon as the material is reproduced.

1. The Ohio River from Toronto, Ohio to McMechen, West Virginia is degraded by waste discharges from municipalities and industries in Ohio and West Virginia causing interstate pollution which is subject to abatement under section 10 of the Federal Water Pollution Control Act, as amended.

2. While State and interstate pollution control programs have secured and are securing abatement, there are waste sources in the conference area in violation of federally approved implementation plans and schedules.

3. Delays in abatement have occurred due to the complexity of the industrial problem and difficulties in public financing.

4. All municipal waste treatment plants in the conference area shall provide a minimum of secondary treatment and adequate disinfection of their waste effluents. Secondary treatment is defined as that which provides a minimum of 85 percent reduction of both

Conclusions and Recommendations

suspended solids and oxygen-demanding material as measured by the 5-day biochemical oxygen demand (BOD_5) test. Adequate disinfection is defined as that which provides an effluent with a free chlorine residual of 0.5 mg/l after 20 minutes' contact at design maximum flow.

5. All industrial waste sources are to provide, as a minimum, the equivalent of secondary treatment as applied to organic wastes.

6. All wastewaters, as discharged to the Ohio River or its tributaries in the conference area from municipal and industrial sources, including active mining operations, shall meet the following criteria:

a. Substantially complete removal of oil (in whatever state, including free, emulsified, dispersed and dissolved oils), debris, scum, and other floating materials. In general, a total net oil concentration of less than or equal to 10 mg/l will be considered adequate for discharge.

b. Reduction of suspended solids, dissolved solids, and other materials to such degree that the discharge will not produce turbidity, color, or odor in the river, or impart taste to potable water supplies or cause the tainting of fish flesh. In general, the net concentration of suspended solids

shall not exceed 30 mg/l.

c. pH shall be between 5 and 9 standard units. However, more restrictive requirements will be required to control the discharge of dissolved iron and acidity.

d. Reduction of any and all constituent materials to such a degree that the concentration thereof, singly or in combination, in any discharge is not harmful to human health, and reduction of the following chemicals to such a degree that the concentrations thereof in any discharge do not exceed (1) the limits specified in the tabulation below or (2) such lower limits as may be required for compliance with subparagraph (e) of this recommendation:

<u>Inorganic Chemicals</u>	<u>Limiting concentration (mg/l)</u>
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium (hexavalent)	0.05
Lead	0.05
Mercury	0.005
Selenium	0.01
Silver	0.05

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<u>Organic Chemicals</u>	<u>Limiting concentration (mg/l)</u>
Cyanide	0.2

e. The Federal and West Virginia conferees recommend that the discharge shall not contain amounts of phenols which will cause a concentration in the receiving stream to exceed .001 mg/l. The Ohio and ORSANCO conferees have not participated in this

recommendation since these entities have not adopted a stream water quality criterion for phenol.

f. Reduction of any material, or, if necessary, all materials, contains in any discharge which singly or in combination are toxic or harmful to aquatic life to such a degree or degrees that the calculated concentration(s) of such material or materials in the river does not exceed one-twentieth of the 96-hour median tolerance limit (96-hr. TL_m) for aquatic life.

7. All municipal and industrial waste sources, including active mining operations, in the conference area have treatment facilities installed and operating to meet the recommended criteria by January 1, 1975, except when completion is required earlier by court decision or can reasonably be expected to be achieved earlier. Interim dates for all waste sources in the conference area are to be submitted by the respective conferees to the conference chairman within 3 months.

8. Oil, phenols, and cyanides constitute a major waste problem in the conference area. The earliest possible dates for abatement of these waste sources are to be established by the States of Ohio and West Virginia. Dates for such abatement are to be submitted to the conference chairman within 3 months.

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9. A technical committee, with representatives of Environmental Protection Agency, ORSANCO, West Virginia, and Ohio, shall investigate the discharges of complex cyanides from blast furnaces and report to the conferees, within 4 months, its findings and recommendations. The EPA shall provide technical and secretarial service to the committee and shall organize the committee and call meetings.

10. The State and interstate conferees recommend that the conference support an increase in construction grant funds availability, commensurate with needs, to enable an accelerated program of municipal waste treatment plant construction in West Virginia and Ohio.

11. The State and interstate conferees recommend that the mine drainage problems caused by abandoned mines be considered a national problem, as recommended for abandoned mines in the Monongahela River Basin, and as such qualify for Federal funds for correction of these problems.

That concludes the recommendations and conclusions.
Are there any statements the conferees want to make?

(No response.)

If not, I am going to adjourn the conference and after this I will be available and the conferees, if you

Conclusions and Recommendations

can get them, will be available for individual answering of questions and consultation.

Before we stand adjourned, again I want to thank the conferees. I do think we have come up with a very tight remedial schedule and program. The program has been expressed, necessarily, in tight technical terms. But essentially it means that we are going to have interim dates, and by the end of 1974 or January 1, 1975 all the municipal and industrial waste facilities are going to be put into operation and completed. We will have interim dates for each and every source so we will know as soon as possible who is falling behind and who is meeting the schedule.

With that, we stand adjourned. Thank you very much.

(Whereupon, at 6:10 p.m., the conference was adjourned.)

* * *

(The following statement was submitted after the close of the conference to be made a part of the record.) 383

OHIO VALLEY ENVIRONMENT COUNCIL

SUBMITTED TO THE INTERSTATE ENFORCEMENT CONFERENCE ON
OHIO RIVER POLLUTION WHEELING, W.VA.

October 13, 1971

Gentlemen:

I am Paul Fabry, Program Director of the Jefferson County Tuberculosis and Health Association, a resident of the State of Ohio, appearing today as a private citizen and as a representative and spokesman for the Ohio Valley Environment Council. A citizen coalition which encompasses eight counties bordering the Ohio River. Hancock, Brooke, Ohio and Marshall Counties in the State of West Virginia; Columbiana, Jefferson, Belmont and Monroe Counties in the State of Ohio.

By now, every one knows pollution is harmful, costly and unjust. But it stays with us because it still pays. It pays a polluter who has always used the river as a dumping ground to avoid costly filtering equipment. It pays his customers who buy goods at lower prices and join him in passing the ignored costs to those down stream.

Our society, which favors a self-regulating allocation of raw materials by use of a monetary system of values, has not seen fit to put the true costs of pollution into this choice mechanism. We are reduced to solving our grave pollution problems by exhorting a latently blooming moral pressure, marshalling a poor array of laws which ill define pollution and are administered by an inadequate, financially strapped administrative organization. Here and there we throw in a loan, tax write-off, or other subsidy. In belief that the ends justify the means, we have even enlisted the "Baudy house" laws.

Waste disposal should be a legitimate cost of production. It should not be treated in a manner different from any other legitimate cost. This should be made national policy and our industrial leaders should accept this principle.

They are not the only ones entitled to use our water resources. The public has a right to pure drinking water. Citizens have a right to recreational uses of waterways.

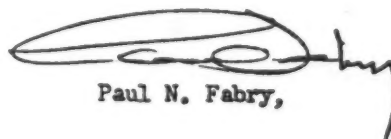
Our rivers and lakes belong to all Americans. They were not meant to be the private dumping grounds for industrial concerns. Since they are in public domain, the public has a right to charge those who despoil them and to spend the monies collected on restoring the quality of the water. There is no reason why all Americans should be made to bear the cost of cleaning up water which industry has used without any charge or penalty in additional taxes to carry away its waste products.

There is no justification in this polluted day and age to continue to write off the rivers as being convenient sewage systems to be used and abused by industry and municipalities.

Each pollutor must be assessed and charged with penalties in substantial sums based on the quantity of the waste discharged, and also on its relative strength and toxicity. Effluent charges should be considered, whereby a discharge is rated according to its severity, and licensed accordingly. We are granting licenses to pollute our rivers and it would be better to assign them at their true market value rather than give them away.

In conclusion, our environment should not be a luxury to pollutors and should not be a non-essential that can be shelved in deference to political whim, or the economy and progress.

Gentlemen; I wish this statement to be included in the record of this public hearing. Thank you.



Paul N. Fabry,

Program Director
Jefferson Co. TB & Health Association

JOHN J. GILLIGAN, Governor

State of Ohio

385

450 East Town Street
P.O. Box 118
Columbus, Ohio 43216



Department of Health

November 3, 1971

Mr. Francis T. Mayo
Regional Administrator
Environmental Protection Agency
Region V
1 North Wacker Drive
Chicago, Illinois 60606

Dear Mr. Mayo:

For the record in matters regarding interstate pollution of the Ohio River, Wheeling, West Virginia, -Steubenville, Ohio, area, I wish to call your attention to an error in my presentation relative to the municipal wastewater treatment facilities provided the Village of Adena.

The village has an oxidation ditch facility in operation. Accordingly, would you correct the references to this matter which occur on page 2 line 7 and the third entry in Table 2.

Very truly yours,

John E. Richards

John E. Richards
Acting Chief
Division of Engineering

cc: Mr. John W. Ferguson